COMMERCIAL FERTILIZER

CONSOLIDATED WITH THE FERTILIZER GREEN BOOK

NITROGEN DIVISION ALLIED CHEMICAL

Nitrogen Division

PRODUCTS

NITROGEN SOLUTIONS (NITRANA† AND URANA†)

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SULPHATE OF AMMONIA

UREA PRODUCTS

ARCADIAN† THE AMERICAN NITRATE of SODA

ARCADIAN† INSECTICIDES and WEEDICIDES

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Nitrogen Division

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Atlanta 3, Ga. • South Point, Ohio • San Francisco 3, Calif.

JUNE, 1953

Air view showing dryers and rock storage at Pierce, Florida, headquarters of A.A.C. phosphate mining operations. (Top) Sample of Florida Pebble Phosphate Rock, source of phosphorus widely used in the chemical industries, in its elemental form as well as in phosphoric acid, phosphates and phosphorus compounds. ¶ This pebble rock is also the principal source of the most important—and most generally deficient—plant food element. Often called the Key to Life, phosphorus is essential in maintaining and improving crop yields. Health, growth, life itself, would be impossible without phosphorus . . . so in a way these phosphate pebbles are more precious than gold.

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LION SULPHATE OF AMMONIA—For direct application or formulation. Large free-flowing crystals. Guaranteed nitrogen content, 21%.

TECHNICAL SERVICE—Lion provides special technical assistance for fertilizer manufacturers. Write to CHEMICAL SALES DIVISION for quick service.

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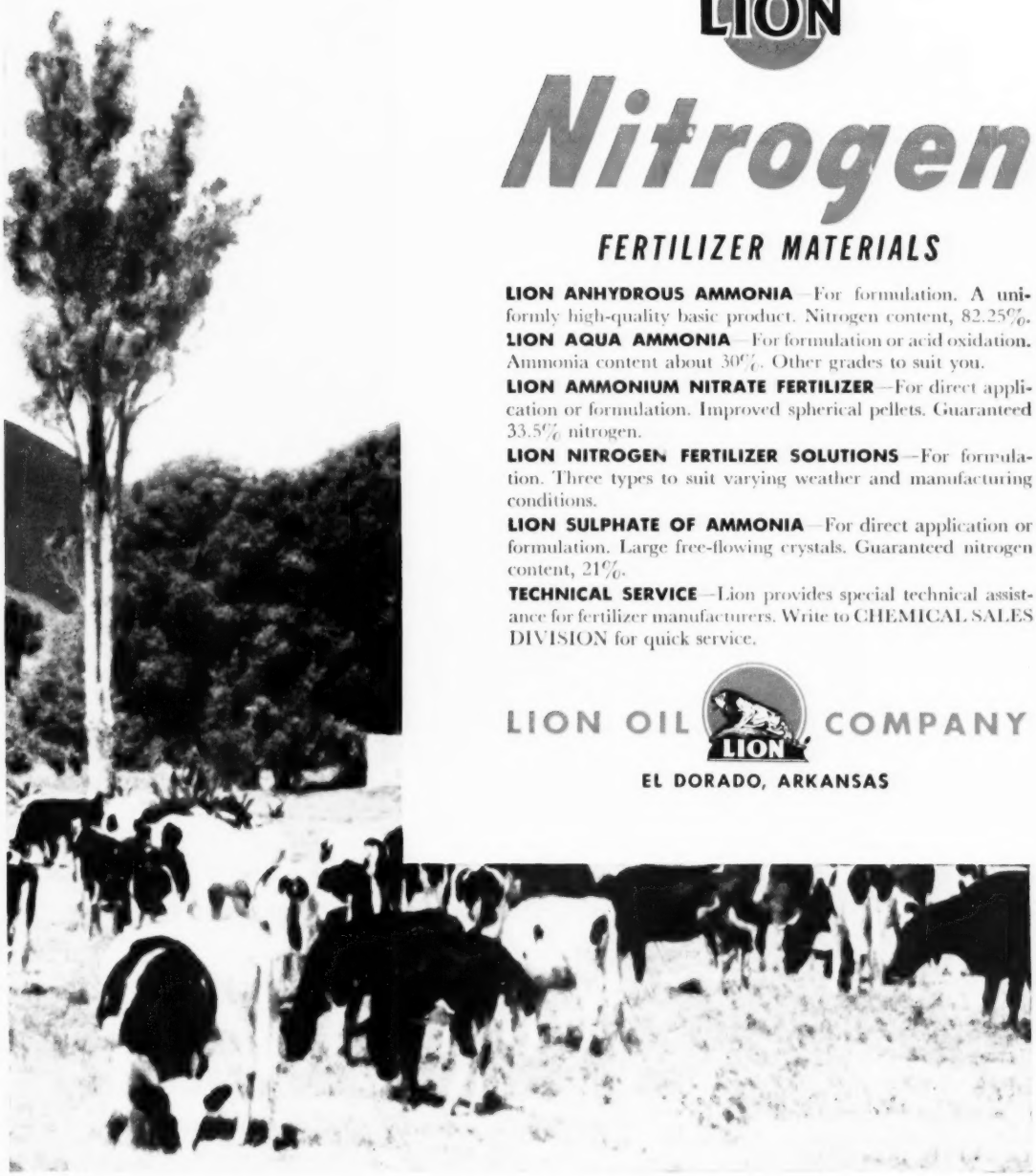

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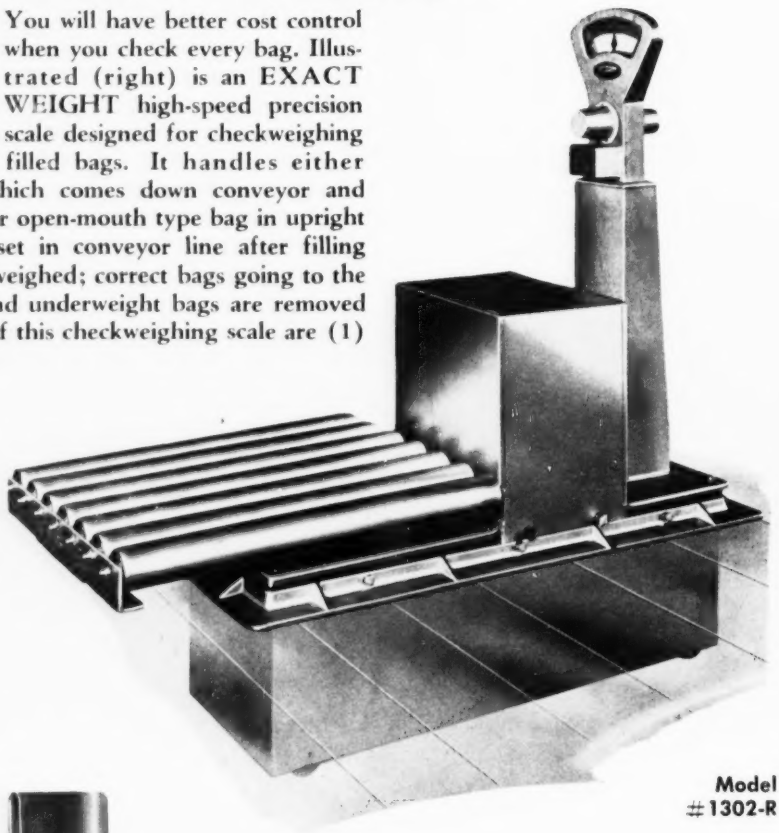
Two Important Weighing Units for Chemical Packaging . . .

You will have better cost control when you check every bag. Illustrated (right) is an EXACT WEIGHT high-speed precision scale designed for checkweighing filled bags. It handles either valve pack type bag which comes down conveyor and crosses scale on its side or open-mouth type bag in upright position. The scale is set in conveyor line after filling operation. Each bag is weighed; correct bags going to the sewing machine, over and underweight bags are removed for trimming. Features of this checkweighing scale are (1) checkweighs each bag (2) fits into any production line (3) illuminated dial warns operator when filling operation needs adjustment; (4) standard capacity to 100 lbs., more weight if needed. For full specifications write for circular covering EXACT WEIGHT Model #1302-R.



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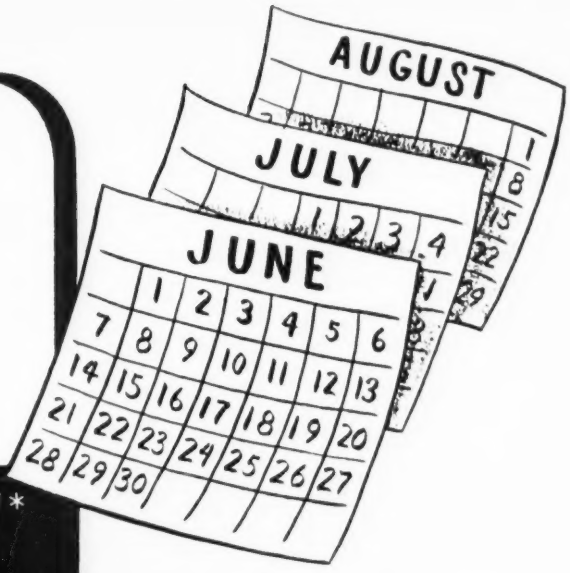

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THE LOW-COST CURE ACCELERATOR

can save you time and money in the months to come!

AS LITTLE AS ONE-POUND Nacconol* PER TON OF FERTILIZER

1. **Assists in keeping finished fertilizer free-flowing —in the bag and in the curing bin**
2. **Avoids the regrinding of lumped bagged goods**
3. **Substantially reduces curing time**
4. **Breaks the bottleneck of curing-bin capacity**

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Use *Nacconol NR Flake* or *Dense Beads* — the free flowing, non-dusting types that disperse beautifully and uniformly. Add the required amount at the weighing hoppers or pre-mix with potash or other dry materials being used in the mixture. Distribute Nacconol throughout mix as thoroughly as possible. It's simple and easy as that! Remember Nacconol is time-tested . . . your best all-around money value. Millions upon millions of pounds of Nacconol have been used over the past twenty years in America's leading industries. Available from nearby warehouse stocks. Write, wire or phone our nearest office.

COMMERCIAL FERTILIZER

ESTABLISHED 1910

June, 1953

Vol. 86 No. 6

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weigh all the facts before you build a

Extensive research and investigation of all the facts are necessary to make the building of a fertilizer plant economically sound. Where is the plant to be located? What is its proximity to supply? To distribution? How seasonal are demands in the plant area? What basic ingredients will be used more often? What return can be expected on the capital investment? These and many other facts must be considered in order to produce a sound enduring investment.

Many years of experience in the fertilizer industry have made Harte engineers congnizant of the over-all picture of fertilizer plant design, realizing that certain fundamentals must be followed while specializing the design of each plant. All possible facts are studied and adapted to fit each individual fertilizer plant.

The invaluable experience of Harte engineers is available to aid you in your fertilizer plant design. If you plan to build a fertilizer mixing plant, or an associated plant, the Harte organization of specialists can handle your complete job or any part from original design to an operating plant . . . assuring economy and speed.

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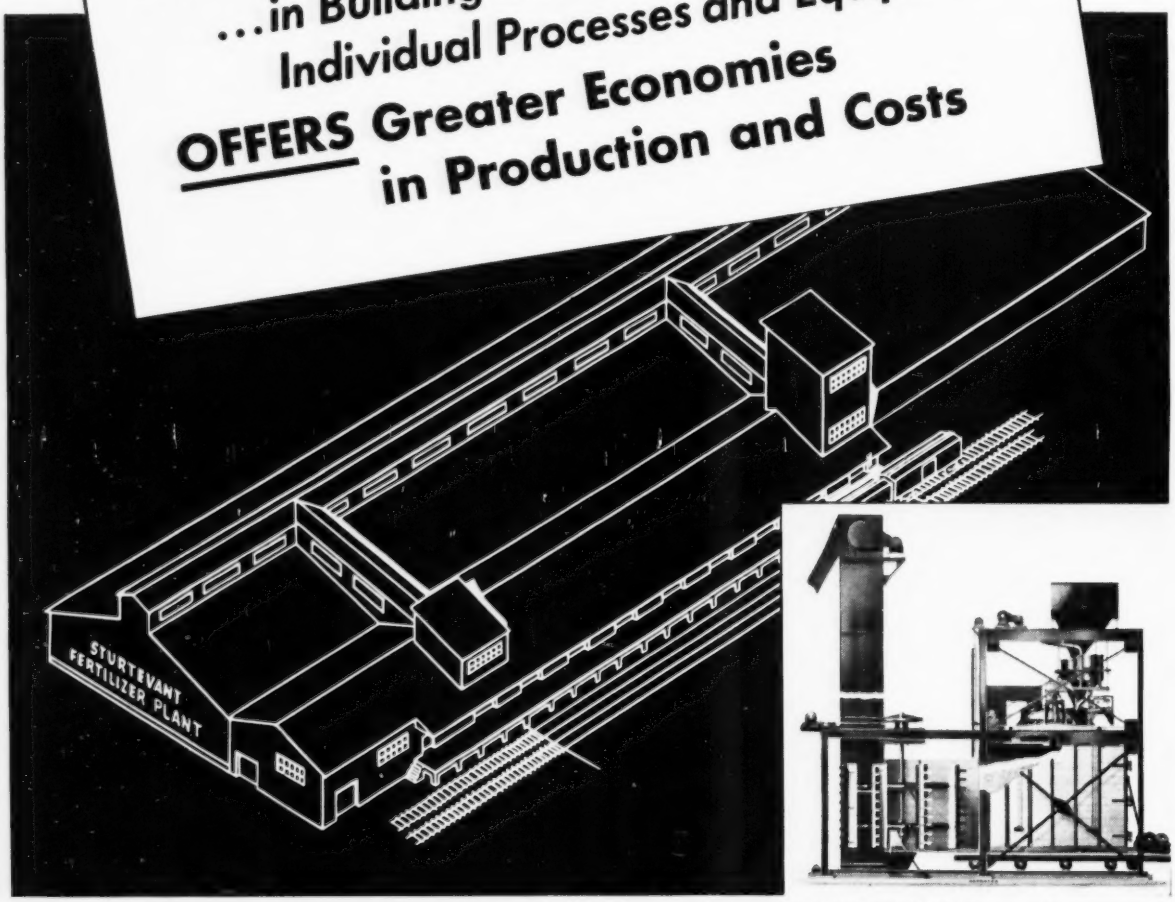

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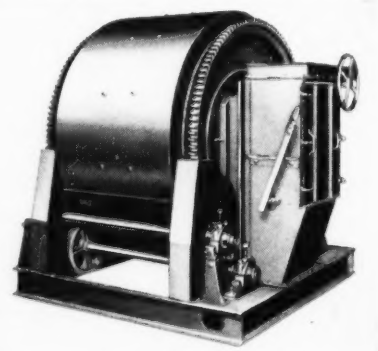
The experience gained through 71 years of intimate association with the fertilizer industry and its problems gives Sturtevant the expert "know-how" in fertilizer plant design that can save you time and money.

Whether you plan to build a new plant, modernize or buy new equipment, it will pay you to consult Sturtevant Mill. Our engineers, specialists in fertilizer manufacture, are available for consultation. Ask for their services, today. You will keep ahead with Sturtevant.



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Sulphur

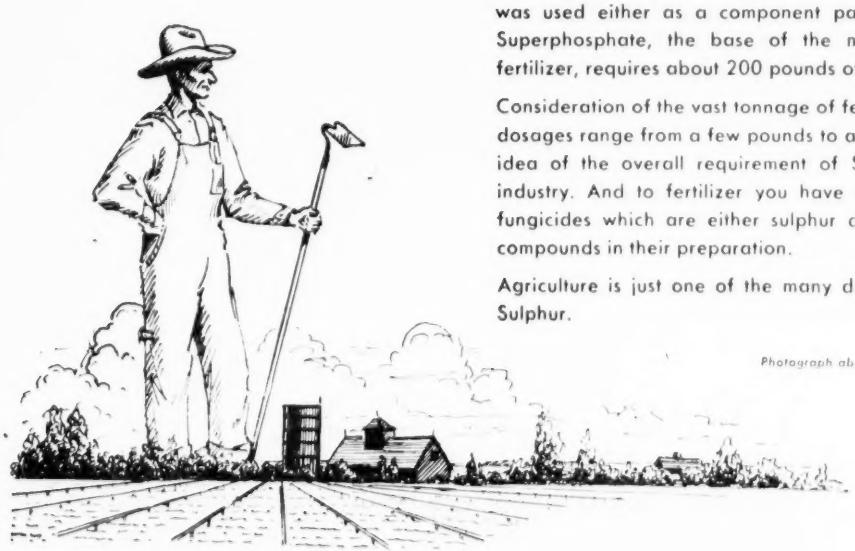
Thousands of tons mined daily, but where does it all go?

THE DEPARTMENT OF AGRICULTURE reports that in 1950 some 336,000,000 acres of land in the United States were under crop cultivation. That's a lot of acreage.

But where, you might ask, is the connection with Sulphur? Fertilizer, to take just one phase of agriculturally-used chemicals in which Sulphur was used either as a component part or as a processing element! Superphosphate, the base of the most widely used manufactured fertilizer, requires about 200 pounds of Sulphur for every ton produced.

Consideration of the vast tonnage of fertilizer used in agriculture — and dosages range from a few pounds to a ton or more per acre — gives an idea of the overall requirement of Sulphur for this one division of industry. And to fertilizer you have to add all the insecticides and fungicides which are either sulphur derivatives or have used sulphur compounds in their preparation.

Agriculture is just one of the many destinations of great tonnages of Sulphur.



Photograph above shows our loading dock at Galveston, Texas

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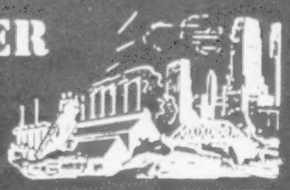
JUST AROUND THE CORNER



By Vernon Mount

LAUREL-RESTING is an American failing, I'm afraid. Witness what happened after World War II, when we rested on our laurels, and let our military establishment fall dangerously low.

BUSINESS MEN, feeling they have real friends in the Republican administration, are minding their own businesses now, and leaving their Washington friends strictly alone. But those new officials need the help of business. The pink opposition is still with us, still pressuring quietly -- and very much organized.

ASSOCIATIONS are feeling the same lassitude. Their members used to dash to the rescue whenever called upon. Now they figure the government will do right by them automatically, forgetting that what happens in Washington depends largely on what Washington hears from the folks back home.

TOO NARROW a margin exists in Congress, and an election is coming up which might swing the balance back--and bring in new pinko votes. Unless business stays alert, and continues to back up the sound men in Washington who are trying their best--those men may find themselves over-ruled by a Congress made unfriendly by the liberal termites who are always in there, burrowing.

Yours faithfully,

Vernon Mount

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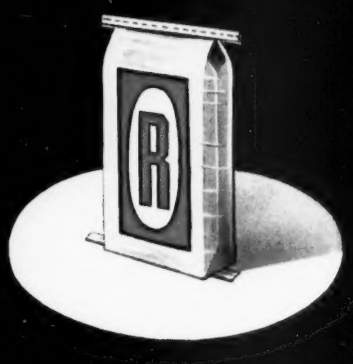

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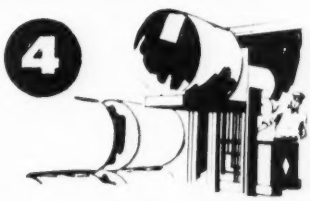

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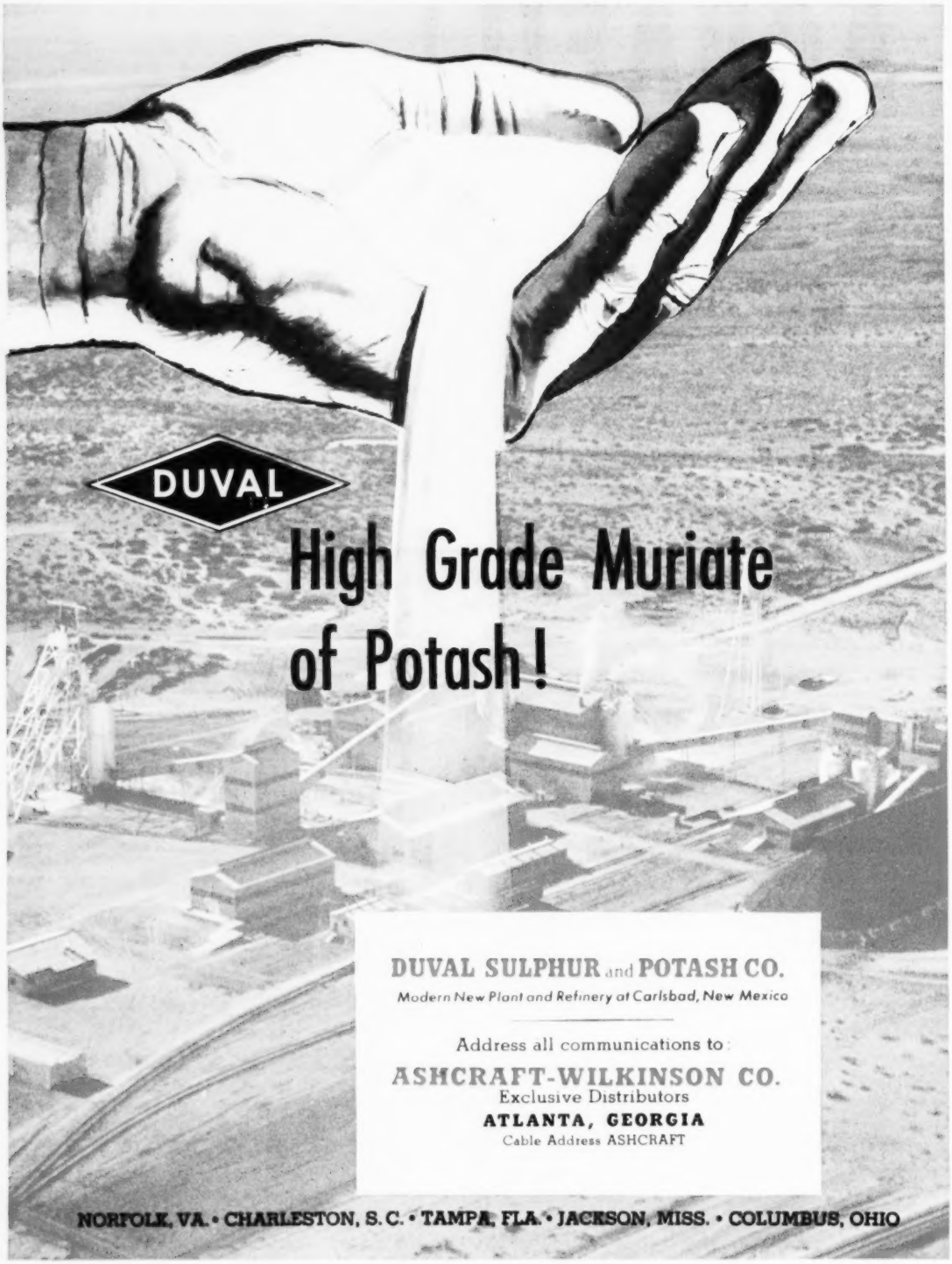
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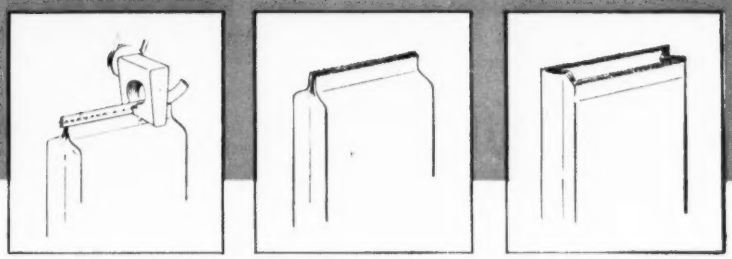

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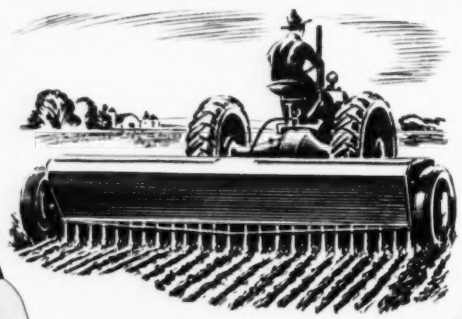

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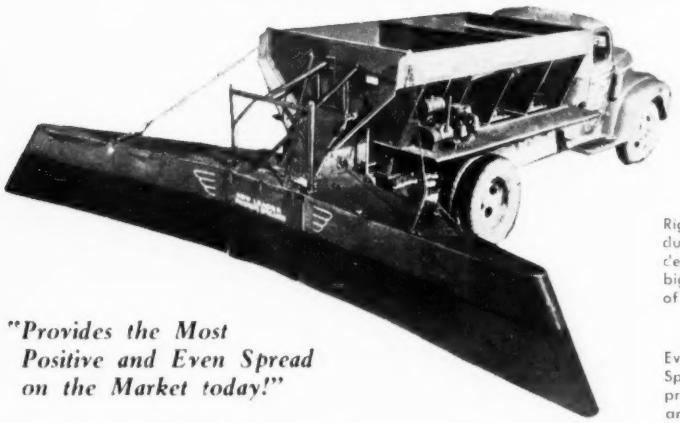

"Provides the Most Positive and Even Spread on the Market today!"

by recommending the "New Leader" SPREADER *for Custom Spreading*

Right in your territory, there are men who can be induced to go into the business of custom spreading. Many dealers of commercial fertilizer and limestone are getting bigger sales volume through the aggressive promotion of the custom spreading idea.

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"NEW LEADER" Scores 10 FIRSTS

1. The first successful truck mounted lime spreader that could handle stock pile lime satisfactorily.
2. The first successful lime spreader with a chain conveyor.
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5. The first lime spreader with a back endgate swinging wide open.
6. The first lime spreader with running boards or catwalks as standard equipment.
7. The first lime spreader with a 24" wide conveyor trough.
8. The first spreader with an all-steel frame and wooden hopper.
9. The first lime spreader with a successful attachment for spreading bulk or sacked commercial fertilizer.
10. And now! The first commercial fertilizer spreader with distributor discs driven at a constant speed by a separate motor. Conveyor chain positively synchronized with speed of rear truck wheels, assuring full width spread at all times and uniform distribution.

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- LIMESTONE SPREADER
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- BULK TRANSPORT
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- HI-WAY MATERIAL SPREADER
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"New Leader" Spreaders spread a minimum of 100 pounds per acre, to any maximum desired up to 4½ tons per acre. Send coupon for free literature and name of your local distributor.

"NEW LEADER" SELF-UNLOADING BULK TRANSPORT

Penninsular Spreading Service of Kissimmee, Florida purchased three 33-ft. New Leader Self-Unloading Bulk Transports and two New Leader Fertilizer Spreaders for spreading fertilizer on pastures and in citrus groves. This 20-ton transport with elevator in place is ready to load a "New Leader" Spreader Truck. Eliminates demurrage on freight cars; gets fertilizer to the job quickly. Spreader trucks can stay in field as this is a complete self-unloading unit, leaving tractor free to return for another transport load. Unit divided into four 5-ton compartments. Each may be unloaded independently. Compartments and endgate removable for hauling bagged and packaged goods. Capacity 5 to 25 tons, 11 to 40 feet long.

HIGHWAY EQUIPMENT COMPANY, INC.

Manufacturers of the World's most complete line of Spreaders and Bulk Delivery Equipment

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Send full information on:

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supplies the 2 key forms of nitrogen

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easy to use

Pelletized and properly sized for flow. Easy to handle, ready to use for top dressing, side dressing and irrigation.

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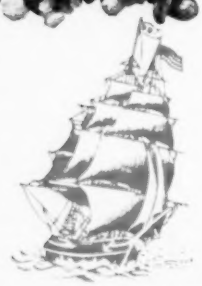

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Canadian Convention at St Andrews-by-the-Sea

July 6 to 10 will see the Plant Food Producers of Ontario, Quebec, enjoying their convention and visit to the Algonquin at St. Andrews by-the-Sea, New Brunswick, Canada. The program is not complete as we go to press, but it is known that a number of prominent speakers have agreed to attend, according to A. Mooney, Chairman, of Canada Packers, Ltd., Toronto.

Among these are W. R. Shaw, Deputy Minister of Agriculture for Prince Edward Island; Dr. George R. Smith, Director Soils and Fertilizer, Nova Scotia Department of Agriculture; S. A. Hilton, Superintendent, Dominion Experimental Station, Fredericton. In addition they are hoping to have Russell Coleman, NFA president, and Paul Truitt, APFC president.

The convention is an informal one throughout, and provides—in addition to the serious program already mentioned—entertainment throughout the meeting, which includes dancing, movies, bingo, tennis, shuffle board, launch trips, sightseeing trips, swimming, fishing and golf.

The Algonquin Hotel has 230 private rooms and suites. It is a charming, many-gabled, half-timbered structure, designed for hospitality and dispensing it with charm. Provision is made for children to enjoy the attended play area while their families are enjoying other phases of the hotel's many features.

St. Andrews by-the-Sea is easy to reach by motor, or by Canadian Pacific Trains, which run there daily except Sunday. Rates at the hotel are $16 for men, $8 for ladies, American plan. The convention registration fee is $25 each for men—no charge for the ladies. Arrangements should be made with C. W. Jarvis, association secretary, Canadian Industries, Ltd., 3434 Dundas Street West, Toronto 9, Ontario.

It Seems to Me

by BRUCE MORAN

It seems to me this is the time to start selling the basic fact that fertilizer is the agent that cuts down the high cost of everything else connected with farming.

I don't mean only that all other costs have doubled and trebled, while fertilizer has not. I mean that the farmer must learn to figure overall cost with and without fertilizer—and learn that it's more profitable to raise 100 bushels of corn than 50 on the same acre, or to raise a full bale instead of half a bale of cotton . . . and that fertilizer and a little elbow-grease make the difference.

Farmers really do not need to be sold on fertilizer as such. But they surely need to be sold on the economics of the results they get from fertilizer.

This is the time of the year when a lot of us go fishing. It seems to me if we go fishing along the country roads, instead of the streams, we'll come up with a far more valuable catch . . . and a real salesman will get more fun out of doing an educational job than he will out of fishing, and have a lot more to show for it!

INDUSTRY CALENDAR

Date	Organization	Place	City	State
June 11-14	APFC	Homestead	Hot Springs	Va.
June 15-17	NFA	Greenbrier	White Sulphur	W. Va.
June 30-July 2	Pacific N. W.	Harrison	Hot Springs	Brit. Col.
July 6-10	Canadian	Algonquin	St. Andrews	N. B.
Sept. 9-11	NAC	Essex & Sussex	Spring Lake	N. J.
Nov. 4-5	Pacific N. W.	College	Pullman	Wash.
Nov. 9-10	CFA	Theatre	Carmel	Cal.
Nov. 10-20	Crop, Soil	———	Dallas	Tex.

Commercial Fertilizer Consumption in the United States — 1951-52

By
WALTER SCHOLL &
HILDA M. WALLACE
Division of Fertilizer and
Agricultural Lime
Bureau of Plant Industry, Soils, and
Agricultural Engineering
Agricultural Research Administration
U. S. Department of Agriculture
Beltsville, Maryland

This 13th annual survey shows consumption of fertilizers in the United States, including the Territories (Hawaii, Puerto Rico, Alaska), amounted to 22,432,418 tons during the year ended June 30, 1952. Of this total, mixed fertilizers, 15,086,349 tons, comprised 67.3 percent, materials containing one or more primary plant nutrients (N, P_2O_5, K_2O) 6,561,019 tons (29.2 percent), and secondary and minor element materials 785,050 tons (3.5 percent). Consumption of all fertilizers was 1,441,024 tons or 6.9 percent greater than the revised total (20,991,394 ton) for 1950-51 (1). Increases in consumption of these classes were for mixed fertilizers 1,107,967 tons 7.9 percent), materials containing primary nutrients 194,276 tons (3.1 percent), and secondary and minor element materials 138,781 tons (21.5 percent) greater than their respective consumption in 1950-51. Fertilizers consumed in 1951-52 contained a total of 5,205,623 tons of primary plant nutrients consisting of nitrogen 1,424,780 tons, available P_2O_5 2,199,376 tons, and K_2O 1,581,467 tons. These quantities represented a net increase for nitrogen of 187,803 tons (15.2 percent), for available P_2O_5 89,476 tons (4.2 percent), and for K_2O 201,654 tons (14.6 percent) over 1950-51. The total content of P_2O_5 in all fertilizer consumed was 2,678,070 tons. The weighted average total primary nutrient content in all commercial mixtures compared consumed in 1951-52 was 24.86 percent as with 24.19 percent in 1950-51.

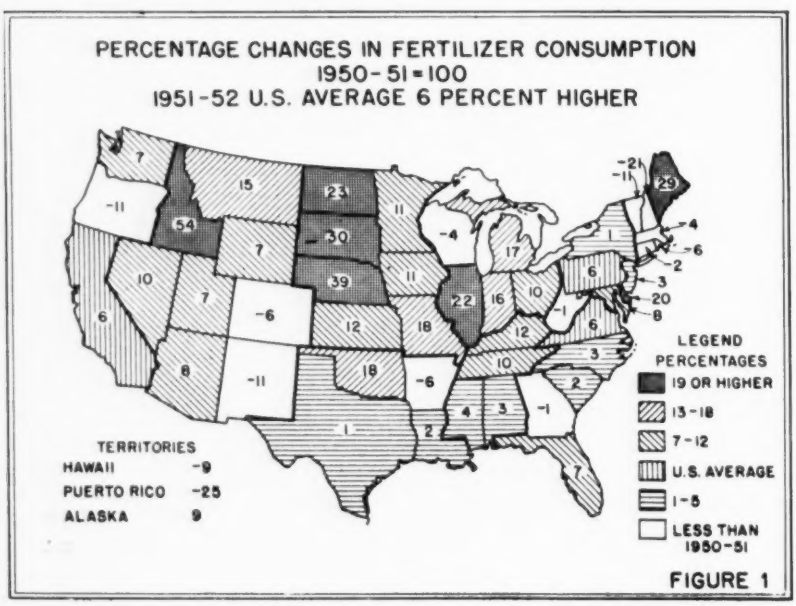

FIGURE 1

The Survey

Presented herein are eight tabulations and two figures designed to show the quantities, kinds, and grades of fertilizers and their primary plant nutrient content that were consumed in the United States and Territories during the year ended June 30, 1952. Included are certain comparisons with earlier years. These tabulations were prepared from reports, submitted to the Division of Fertilizer and Agricultural Lime, by manufacturers, showing the number of tons of fertilizer shipments for consumption in agriculture throughout the forty-eight States and the Territories. Supplementary information was furnished by the State fertilizer control officials and agronomists. All of this assistance is greatefully acknowledged. The word "ton" means the short ton.

State Consumption

Table 1, shows the total tonnages of mixtures and all materials (including the secondary and minor element materials) consumed in each State, Hawaii, Puerto Rico and Alaska. Consumption in other Territories was negligible. The changes in consumption of fertilizers and of primary nutrients are in percentage of 1950-51, as the base year These data are presented together in this table to facilitate direct comparisons. The changes in the consumption of all fertilizers that contain primary by only nutrients are shown, in Fig. 1, by States. Increases were generally highest in the North Central States where 6,301,511 tons or 28.1 percent of all fertilizers were consumed. These States accounted for 821,354 tons (57.0 percent) of the national increase or 1,441,024 tons. In the Southern States, com-

Table 1. - Consumption of Fertilizers, Year Ended June 30, 1952 1/

State & Region	Mixtures			Materials			All Fertilizers 1951-52	Relative Consumption 1950-51 = 100	
	July 1 - Dec. 31, 1951	Jan. 1 - June 30, 1952	Total	July 1 - Dec. 31, 1951	Jan. 1 - June 30, 1952	Total		Fertilizers 2/	Total N, Avail. P_2O_5, & K_2O
	Tons	Tons	Tons	Tons	Tons	Tons	Tons	Percent	Percent
Maine	22,370	179,088	201,458	4,714	6,359	11,073	212,531	129	131
New Hampshire	2,233	12,915	15,148	1,325	4,549	5,874	21,022	79	78
Vermont	11,757	26,892	38,649	8,697	8,803	17,500	56,149	89	95
Massachusetts	9,795	64,453	74,248	5,142	12,689	17,831	92,079	98	93
Rhode Island	1,480	12,865	14,345	600	1,794	2,394	16,739	94	99
Connecticut	5,601	52,947	58,548	6,336	22,350	28,686	87,234	98	100
New England	53,236	349,160	402,396	26,814	56,544	83,358	485,754	106	109
New York	97,983	388,629	486,612	40,239	108,066	148,305	634,917	101	103
New Jersey	47,925	193,086	241,011	7,127	16,844	23,971	264,982	103	104
Pennsylvania	166,811	401,005	567,816	33,534	63,605	97,039	664,855	106	110
Delaware	15,020	59,089	74,109	1,917	4,361	6,278	80,387	120	124
District of Columbia	367	1,364	1,731	204	606	810	2,541	117	120
Maryland	77,281	190,024	267,305	9,490	20,131	29,621	296,926	108	110
West Virginia	15,807	57,528	73,135	7,472	19,271	26,743	99,878	99	101
Middle Atlantic	420,994	1,290,725	1,711,719	99,983	232,784	332,767	2,044,486	105	107
Virginia	179,560	560,167	739,727	29,362	99,822	129,184	868,911	106	109
North Carolina	251,590	1,319,604	1,571,194	81,055	288,930	369,985	1,941,179	103	104
South Carolina	115,391	602,910	718,301	58,118	202,712	260,830	979,131	102	105
Georgia	162,942	890,265	1,053,207	64,470	183,434	247,904	1,301,111	99	103
Florida	384,392	589,173	973,565	48,359	68,127	116,486	1,090,051	107	106
South Atlantic	1,093,876	3,962,119	5,055,994	281,364	843,025	1,124,389	6,180,383	103	106
Ohio	315,931	667,510	983,441	24,010	42,096	66,106	1,049,547	110	113
Indiana	244,941	689,233	934,174	54,678	94,383	149,061	1,083,235	116	119
Illinois	188,113	407,094	592,207	416,938	423,203	842,141	1,434,348	122	141
Michigan	185,627	350,933	536,560	15,337	39,024	54,361	590,921	117	119
Wisconsin	73,523	277,235	350,758	16,102	26,803	42,905	393,763	96	101
East North Central	1,008,235	2,392,005	3,397,240	529,065	625,509	1,154,574	4,551,814	114	119
Minnesota	37,768	133,434	171,202	18,157	35,747	53,904	225,106	111	114
Iowa	66,744	211,102	277,846	58,964	90,118	149,082	426,928	111	117
Missouri	121,120	306,710	427,830	110,715	214,560	325,265	753,095	118	125
North Dakota	5,150	16,325	21,475	2,215	7,458	9,673	31,148	223	226
South Dakota	1,210	4,423	5,633	2,225	3,436	5,661	11,294	130	130
Nebraska	6,338	26,507	31,940	23,788	38,308	62,596	94,436	139	154
Kansas	37,126	47,460	84,586	62,891	60,215	123,104	207,690	112	112
West North Central	275,456	744,956	1,020,412	278,955	450,330	729,285	1,749,697	116	122
Kentucky	77,672	406,280	482,952	59,336	87,931	147,167	630,119	112	121
Tennessee	77,957	365,370	443,327	57,805	101,728	159,533	602,860	110	121
Alabama	132,902	737,373	870,275	204,213	268,121	472,334	1,342,609	103	106
Mississippi	25,684	345,249	370,933	197,528	267,157	464,696	835,628	104	109
East South Central	314,215	1,353,272	2,167,487	518,882	714,947	1,233,729	3,401,216	106	112
Arkansas	14,897	173,171	188,068	40,713	129,960	170,673	358,741	94	94
Louisiana	29,315	150,768	180,083	50,475	99,778	150,253	330,336	102	109
Oklahoma	12,514	52,504	65,018	51,120	56,617	107,637	172,655	118	121
Texas	64,967	228,614	293,581	162,478	159,406	321,883	615,364	101	107
West South Central	121,693	604,957	726,650	304,786	445,660	750,446	1,477,096	101	105
Montana	709	2,570	3,279	8,116	11,948	19,964	23,243	115	112
Idaho	192	11,425	11,617	14,395	47,220	61,615	73,232	154	154
Wyoming	49	622	671	1,459	4,626	6,085	6,756	107	106
Colorado	876	19,707	20,583	7,401	19,547	26,948	47,531	94	95
New Mexico	466	1,054	1,520	5,318	12,242	17,560	19,080	89	93
Arizona	5,957	18,386	24,343	42,989	49,275	92,164	116,507	108	109
Utah	333	2,246	2,579	11,617	16,437	28,054	30,633	107	107
Nevada	143	498	641	1,474	3,597	5,071	5,712	110	107
Mountain	8,725	56,508	65,233	92,669	164,792	257,461	322,694	111	111
Washington	5,231	21,491	26,722	25,212	39,714	64,926	91,648	107	114
Oregon	4,635	15,663	20,298	40,717	59,293	100,010	120,308	89	92
California	78,153	136,200	214,353	606,616	806,133	1,412,748	1,627,101	106	105
Pacific	88,019	173,354	261,373	672,544	906,140	1,577,684	1,839,057	104	104
Continental U. S.	3,381,448	11,427,086	14,808,504	2,805,062	4,438,631	7,243,693	22,052,197	107	111
Hawaii	29,990	25,645	55,635	28,334	31,912	60,146	115,681	91	92
Puerto Rico	121,965	100,228	222,193	23,562	18,222	41,784	263,977	75	82
Alaska	1	116	117	0	446	446	563	109	108
Territories	151,956	125,889	277,845	51,896	50,480	102,376	380,221	79	86
Total U. S., 1951-52	3,533,404	11,552,945	15,086,349	2,856,958	4,489,111	7,346,069	22,432,418	106	110
1950-51 3/	3,384,456	10,593,926	13,978,382	2,940,994	4,072,018	7,013,012	20,991,394	100	100
1949-50	2,648,660	9,649,036	12,297,696	2,261,020	3,784,684	6,045,704	18,343,300	88	86

1/ Includes: Ground phosphate rock, basic slag, secondary and minor element materials, such as, borax, sulfur, manganese sulfate, etc. used as separate materials, also fertilizer distributed by Government agencies. Does not include liming materials, but includes gypsum.

2/ Excludes materials not guaranteed to contain the primary plant nutrients, N, P_2O_5, or K_2O. Their quantities are shown in Table 4.

3/ Revised, additional information for Nevada shows consumption in 1950-51 should have been:

	78	695	773	1,074	1,922	2,996	3,769	--	--

Table 2. - Consumption of Principal Mixed Fertilizers in the Continental United States, By Grades, Years Ended June 30, 1952 and 1951

Grade	Consumption		Proportion of Total		Grade	Consumption		Proportion of Total	
	1952	1951	1952	1951		1952	1951	1952	1951
	Tons	Tons	Percent	Percent		Tons	Tons	Percent	Percent
0-8-24	4,810	1,710	.03	.02	5-20-10	19,612	79,611	.13	.22
0-9-27	35,709	49,928	.24	.37	5-20-20	41,045	28,778	.28	.21
0-10-10	4,135	4,652	.03	.03	6-3-6	22,189	23,179	.15	.17
0-10-20	61,740	26,014	.42	.19	6-4-6	6,361	9,367	.04	.07
0-10-30	22,223	18,597	.15	.14	6-4-8	10,694	13,710	.07	.10
0-10-45	3,723	0	.02	.00	6-6-10	3,630	1,011	.03	.01
0-12-12	191,120	144,349	1.29	1.06	6-6-6	2,900	671	.02	<.01
0-12-20	26,167	22,690	.18	.17	6-6-6	70,350	34,837	.48	.26
0-12-26	4,243	5,777	.03	.04	6-6-8	19,732	15,769	.13	.12
0-14-6	3,901	5,406	.03	.04	6-6-9	9,105	29,060	.06	.21
0-14-7	141,394	142,509	.96	1.04	6-6-10	6,245	4,639	.04	.03
0-14-10	43,515	116,829	.29	.86	6-7-7	4,454	4,079	.03	.03
0-14-14	329,421	234,775	2.22	1.72	6-8-4	230,586	260,783	1.56	1.91
0-15-15	16,178	9,476	.11	.07	6-8-6	263,863	266,851	1.78	1.95
0-15-20	3,310	0	.02	.00	6-8-8	269,655	218,334	1.82	1.60
0-16-8	6,241	3,808	.04	.03	6-8-12	43,825	54,644	.30	.40
0-16-16	6,926	0	.05	.00	6-9-9	6,401	7,067	.04	.05
0-20-10	61,248	60,331	.26	.44	6-9-6	15,743	10,261	.09	.08
0-20-20	231,247	217,162	1.56	1.59	6-9-9	9,779	8,889	.07	.07
0-30-18	3,842	2,155	.03	.02	6-9-12	69,548	41,963	.47	.31
2-6-10	6,204	5,302	.04	.02	6-10-4	61,580	55,978	.42	.40
2-10-6	7,310	214	.05	<.01	6-12-4	4,252	3,416	.03	.03
2-12-6	317,886	588,484	2.15	4.31	6-12-6	46,867	41,443	.38	.30
2-12-12	402,717	321,012	2.72	2.35	6-12-12	136,468	80,287	.92	.59
2-16-8	13,601	28,764	.09	.21	6-20-20	3,248	3,884	.02	.03
3-6-6	3,135	4,491	.03	.03	6-24-6	25,896	16,220	.16	.12
3-8-5	13,865	20,044	.09	.15	6-24-12	10,830	12,837	.07	.09
3-8-8	27,331	26,873	.18	.20	6-24-24	3,242	752	.02	.01
3-9-6	800,256	896,177	5.40	6.28	6-30-0	3,101	4,042	.02	.03
3-9-9	407,638	349,478	2.76	2.56	7-7-7	37,204	35,705	.25	.26
3-9-12	45,456	32,721	.29	.24	8-8-8	15,194	17,332	.10	.13
3-9-15	4,271	2,904	.03	.02	8-8-24	21,826	9	.15	<.01
3-9-18	183,369	203,891	1.24	1.49	8-8-4	3,392	249	.02	<.01
3-9-27	79,571	23,229	.54	.17	8-8-8	11,687	1,458	.08	.01
3-10-10	5,660	3,281	.04	.02	8-8-2	2,979	2,663	.02	.02
3-10-12	10,231	7,436	.07	.05	8-8-4	4,822	2,645	.03	.02
3-12-6	682,644	728,914	4.47	5.34	8-8-6	6,162	968	.04	.01
3-12-12	2,261,712	1,841,926	15.41	13.50	8-8-8	10,128	6,753	.07	.05
3-12-9	107,907	119,013	.73	.87	8-8-4	21,323	21,371	.14	.16
3-15-12	3,674	0	.03	.00	8-8-8	286,142	146,855	1.93	1.08
4-4-6	3,293	189	.02	<.01	8-8-10	3,693	3,349	.03	.02
4-4-8	2,982	3,278	.02	.02	8-10-12	11,816	13,086	.08	.10
4-6-7	2,768	2,792	.02	.02	8-12-12	12,371	8,283	.08	.06
4-6-8	7,718	5,716	.05	.03	8-12-16	26,626	20,534	.19	.15
4-6-6	12,366	15,934	.08	.12	8-16-8	4,740	4,622	.03	.04
4-6-8	71,842	85,714	.48	.63	8-16-16	43,075	38,573	.29	.28
4-7-8	114,312	116,955	.81	.87	8-24-8	63,513	37,859	.43	.28
4-8-4	16,439	15,022	.11	.10	8-32-8	33,111	26,999	.22	.20
4-8-8	531,506	584,607	3.59	4.23	9-7-4	8,218	7,814	.06	.05
4-8-8	263,273	264,406	1.78	1.94	9-9-9	4,859	419	.03	<.01
4-8-10	39,521	3,227	.27	.04	10-6-10	38,183	30,094	.26	.22
4-8-12	91,550	83,350	.62	.61	10-6-12	3,242	2,243	.02	.02
4-9-3	81,900	83,010	.55	.61	10-8-20	2,597	3	.02	<.01
4-10-8	622,384	618,461	4.20	4.53	10-8-10	4,838	2,388	.03	.02
4-10-7	508,254	465,310	3.43	3.41	10-8-8	30,755	28,249	.21	.21
4-10-8	8,177	7,990	.03	.06	10-8-6	7,481	2,423	.05	.02
4-10-10	7,484	8,309	.05	.06	10-10-0	18,308	24,328	.13	.18
4-12-6	247,553	384,131	1.67	2.57	10-10-8	38,721	42,591	.26	.31
4-12-8	8,738	12,309	.06	.09	10-10-10	139,392	71,696	.94	.53
4-12-6	215,722	243,398	1.46	1.78	10-12-10	3,451	2,993	.02	.02
4-12-12	82,662	33,067	.56	.24	10-15-15	4,913	3,014	.03	.02
4-12-16	3,589	2,709	.03	.02	10-16-8	10,500	12,361	.07	.09
4-15-0	42,397	51,186	.29	.38	10-20-0	64,576	60,377	.57	.44
4-16-8	62,340	46,928	.42	.34	10-20-10	12,758	11,909	.09	.09
4-16-16	215,224	121,899	1.45	.89	10-30-10	11,366	9,171	.08	.07
4-24-12	86,290	85,092	.58	.48	12-0-10	9,078	14,624	.06	.11
5-3-6	3,359	3,014	.02	.02	12-0-12	6,941	5,669	.05	.03
5-4-8	10,385	8,794	.07	.06	12-4-8	2,709	10	.02	<.01
5-6-6	2,583	892	.02	.01	12-12-12	32,776	15,527	.22	.11
5-6-8	7,490	2,320	.05	.02	12-24-0	8,355	5,359	.06	.04
5-6-10	9,181	5,249	.03	.04	12-24-12	24,832	11,326	.17	.09
5-7-5	18,877	20,166	.13	.15	14-0-14	25,901	19,400	.17	.14
5-7-8	3,941	5,792	.03	.04	14-6-0	2,590	3,502	.02	.03
5-7-10	7,366	6,150	.05	.05	15-6-4	11,229	11,706	.08	.09
5-8-5	3,084	512	.02	<.01	15-15-0	7,124	0	.05	.00
5-8-7	23,291	26,531	.16	.19	16-0-8	4,415	3,747	.03	.03
5-8-8	3,742	142	.03	<.01	16-8-2	3,412	767	.02	.01
5-10-5	908,353	897,573	6.13	6.58	17-7-0	27,487	31,700	.19	.23
5-10-10	863,820	888,939	5.83	6.29	104 mixtures	14,469,229	13,230,382	97.71	96.99
5-10-15	10,338	3,662	.07	.03	Other specified grades 1/	250,361	323,842	1.69	2.37
5-13-16	10,539	8,824	.07	.06	Grade not shown 2/	88,316	86,716	0.60	0.64
5-13-20	3,448	1,536	.02	.01					
5-15-10	8,442	5,956	.06	.04	Total 3	14,808,504	13,640,936	100.00	100.00
5-15-15	11,420	6,180	.08	.06					
5-15-30	3,257	3,239	.02	.03					
5-20-0	5,004	3,463	.03	.03					

1/ There were 984 in 1951-52 and 833 in 1950-51.

2/ There were, at least, 200 to 300 grades not shown by their guaranteed analysis.

3/ Does not include 277,845 tons consumed in the Territories.

prising the States of the South Atlantic and South Central regions, consumption amounted to 11,059,695 tons or 49.3 percent of the total and accounted for 384,097 tons (26.6 percent) of the increase. The Western States, consuming 2,161,751 tons or 9.6 percent of all fertilizers, accounted for 218,882 tons(15.2 percent) and the Northeastern States, comprising the States of New England and the Middle Atlantic regions, consuming 2,530,240 tons or 11.3 percent accounted for 117,290 tons (8.1 percent) of the increase. Consumption in the Territories amounted to 380,221 tons or 1.7 percent of all fertilizers consumed and was 100,599 tons less than for 1950-51.

Consumption of mixed fertilizers increased in 38 States and decreased in 10. The use of materials increased in 25 States and decreased in 23. The greater use of mixed fertilizers accounted for most of the national increase in consumption of fertilizers. Consumption of most of the more important individual materials increased over that for 1950-51, but that of superphosphate decreased, resulting in only a slight net increase in the total consumption of all materials.

Mixtures

Table 2 lists the 164 grades consumed in the Continental U. S. in 1951-52, in amounts of 2,500 tons or more and their consumption in 1950-51. These grades accounted for 14,469,229 tons (95.91 percent) of the total consumption, 15,036,349 tons, of mixtures in 1951-52. Nine of them accounted for 50 percent. Other grades, numbering 984, totaling 250,961 tons, and approximately 200 to 300 special grades, not listed by their guaranteed analysis and totaling 88,314 tons, were also consumed. In addition, 277,845 tons, not included in Table 2, were consumed in the Territories. Grades consumed in the Territories are not included in Table 2, for the reason that those consumed in Hawaii were reported as fractional numbers of the minimum percentages of nutrients and the principal grades consumed in Puerto Rico were not of the kinds gen-

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erally used in the Continental U. S. Although the number of grades listed in 1951-52 totaled 1,148 and in 1950-51, only 992, it does not necessarily follow that there were actually 156 more grades used in 1951-52. There was, apparently, no substantial increase or decrease in the actual number consumed in the two periods. A large part of the 156 was due to manufacturers listing more grades by their guarantees than were listed in 1950-51.

The 164 grades listed in Table 2 represent 104 different ratios of primary nutrients. Of this number, 12 represent 74.9 percent of the total tonnage of mixed fertilizers consumed in the Continental U. S. These are listed in Table 2a. The four leading grades consumed in the Continental U. S. were 3-12-12 (1-4-4), 5-10-5 (1-2-1), 5-10-10 (1-2-2), and 3-9-6 (1-3-2). These were the nutrient ratios most favored in this country.

The principal grades consumed in each Region during the current year are listed in Table 3, with their consumption in each of the respec-

Table 3. - Consumption of Mixed Fertilizers, By Grades, in Each State and Region, Year Ended June 30, 1952

State	Fifteen Principal Grades Consumed in Regions Tons															All Other Grades		Total Tons
																Number 1/	Tons	
New England																		
	5-10-10	5-9-12	0-14-14	5-12-12	5-8-7	6-3-6	0-10-20	8-16-16	8-12-12	7-7-7	5-10-5	6-9-9	0-20-20	5-7-10	10-15-15			
Maine	27,706	69,108	14,470	27,944	4,327	0	893	5,473	9,994	502	438	9,776	215	7,295	4,813	42	16,851	201,456
New Hampshire	3,817	0	2,077	228	1,418	0	1,880	1,228	274	783	300	0	1,086	0	0	29	2,159	16,148
Vermont	7,191	0	11,821	489	496	0	4,990	3,777	115	782	584	0	4,232	0	0	32	4,243	38,649
Massachusetts	18,308	0	2,954	0	9,106	6,909	9,499	2,658	0	5,571	5,728	0	625	0	0	16	15,018	74,248
Rhode Island	6,039	0	978	8	862	0	593	174	529	1,018	853	0	122	0	0	27	3,553	14,345
Connecticut	6,797	0	847	67	8,478	14,946	3,208	1,119	1,096	2,829	2,860	0	2,299	0	0	24	13,992	58,548
Total	69,853	69,108	33,146	28,626	22,706	21,855	20,963	14,506	11,768	11,263	10,733	9,776	8,579	7,295	4,813	77	56,023	402,398
Middle Atlantic																		
	5-10-10	5-12-6	5-10-5	6-8-12	4-12-8	6-12-6	0-20-20	10-10-10	0-14-14	0-14-7	7-7-7	3-9-12	4-12-12	2-12-12	8-16-16			
New York	126,841	31,998	165,866	19,797	5,322	42,807	17,845	25,219	5,205	212	10,033	1,874	34	6	7,457	67	33,156	496,612
New Jersey	138,062	7,762	32,368	453	17,966	257	3,702	3,626	5,091	169	9,683	12,908	66	0	1,164	49	18,763	241,011
Pennsylvania	148,686	210,316	29,494	10,364	15,949	3,765	15,294	10,525	12,658	9,318	2,829	306	22,905	6,896	8,956	74	55,899	567,816
Delaware	23,620	10,340	4,018	4,926	3,794	0	1,302	1,262	2,925	533	113	2,106	128	4,803	1,078	30	8,261	74,109
District of Columbia	18	156	865	194	13	0	22	5	19	10	9	0	0	51	0	12	392	1,731
Maryland	40,785	99,049	25,721	23,403	11,648	0	1,826	2,536	6,519	5,418	2,177	6,803	175	10,737	456	46	52,764	287,808
West Virginia	13,295	16,856	3,576	6	4,328	0	6,833	629	6,246	11,009	3	0	58	769	71	23	9,783	73,138
Total	491,847	384,906	267,889	59,143	59,002	46,849	45,842	43,711	38,660	25,487	24,857	23,296	23,932	22,742	18,284	138	158,998	1,711,719
South Atlantic																		
	3-9-6	4-10-6	4-8-8	3-9-9	2-12-12	3-12-8	4-8-8	5-10-5	6-8-8	0-14-14	8-10-10	4-7-5	4-9-3	3-12-12	4-5-8			
Virginia	80,029	23,849	1	8,861	172,806	160,132	10	64,297	18,120	69,441	33,091	0	4,852	4	0	33	116,346	739,727
North Carolina	446,495	365,200	0	100,558	159,413	64,468	1,742	44,085	69,695	64,821	78,728	0	51,720	0	0	12	115,461	1,571,194
South Carolina	69,863	239,802	0	201,588	0	12,723	39,217	55,346	6,931	2,971	6,333	0	0	68,772	0	11	26,265	718,301
Georgia	36,222	2,173	480,949	93,337	60,004	1,497	109,218	7,035	46,838	1,981	1,859	7	4,836	10,270	45	108	209,090	1,063,207
Florida	20	771	50,546	3,865	2,198	18	70,356	5,989	11,813	1,040	3,011	119,305	20,780	1,832	71,510	719	611,187	973,585
Total	633,726	630,906	531,296	406,107	374,178	249,036	220,537	179,822	152,497	130,064	127,022	119,312	81,950	80,878	71,555	799	1,078,309	5,066,994
East North Central																		
	3-12-12	2-12-8	4-16-16	0-20-20	3-9-18	5-10-10	3-18-9	8-8-8	10-10-10	0-12-12	4-12-8	3-9-27	5-20-20	0-9-27	0-20-10			
Ohio	808,239	98,887	8,822	18,298	8,396	91,074	29,576	14,600	8,333	24,386	17,587	98	5,733	850	648	58	51,013	983,461
Indiana	800,864	28,080	69,042	27,648	34,096	15,801	13,756	38,414	15,586	19,033	9,291	19,047	6,267	6,829	686	57	44,022	954,174
Illinois	302,806	6,345	44,361	14,558	41,531	672	5,933	38,447	27,009	6,881	18,767	35,060	806	4,404	5,789	57	44,168	592,207
Michigan	273,494	47,264	31,019	21,266	14,903	3,311	48,828	6,170	4,487	14,820	10,702	994	7	8,125	2,002	27	52,066	536,860
Wisconsin	180,964	10	24,561	46,089	22,477	90	6,941	1,470	14,839	2,018	5,676	3,919	15,961	5,714	10,950	58	38,293	380,888
Total	1,926,759	180,636	184,965	128,169	121,407	110,748	102,333	93,121	69,854	67,118	60,422	59,118	26,544	25,722	20,076	127	229,564	3,397,260
West North Central																		
	3-12-12	4-12-8	4-24-12	10-20-0	8-24-8	0-8-8	4-16-16	4-16-0	4-16-8	0-20-20	8-32-0	2-12-8	4-12-8	6-24-0	3-9-18			
Minnesota	17,679	0	30,758	1,243	105	11	29,583	45	3,967	18,574	3,574	0	16	2,449	375	67	64,824	171,202
Iowa	68,317	2,196	433	16,439	451	2,695	16,845	33,392	32,713	2,606	7,806	4,047	23,699	18,966	3,110	83	44,302	277,846
Missouri	73,606	92,899	38,885	4,642	49,742	67,822	2,944	737	0	16,600	282	23,879	2,705	0	14,033	17	31,397	427,830
North Dakota	1,075	0	5,705	474	0	0	549	134	276	216	5,094	20	0	1,090	0	32	6,782	21,476
South Dakota	248	108	53	1,990	1	0	206	1,158	95	32	242	0	164	426	0	26	939	5,633
Nebraska	36	844	13	8,743	356	18	0	668	121	180	4,764	0	42	123	0	21	16,252	31,860
Kansas	1,903	10,831	984	29,897	11,201	1,180	8	2,029	79	375	10,306	3,847	0	292	109	29	11,973	84,586
Total	162,870	106,884	76,827	63,658	61,858	71,726	50,231	38,164	37,251	38,583	32,067	31,793	26,624	23,346	17,627	134	196,169	1,020,412
East South Central																		
	4-10-7	6-8-4	6-6-8	5-10-8	3-3-6	0-14-14	6-8-8	6-12-12	2-12-6	0-12-12	5-12-12	4-12-8	5-10-10	4-8-8	4-12-4			
Kentucky	0	51	5,158	1,163	51,850	8,192	92,470	4,677	70,347	37,780	40,308	46,096	20,724	173	5,521	47	92,232	462,952
Tennessee	163	7,798	9,991	6,523	114,421	655	4,580	67,413	11,474	36,782	11,175	4,976	19,144	41,233	28,525	47	56,486	443,747
Alabama	458,561	211,296	62,499	2,850	27	97,581	84	114	2	18	6	1	15	99	0	50	37,044	870,275
Mississippi	5	3,902	144,933	177,458	0	7,641	2,172	16	0	0	141	0	8,347	8	194	28	26,066	370,933
Total	458,729	223,047	220,581	188,094	166,706	113,169	99,311	96,220	86,786	74,964	57,653	51,073	48,230	41,513	34,240	96	215,828	2,147,487
West South Central																		
	5-10-5	4-12-4	8-8-8	0-14-7	3-12-12	6-8-12	3-8-18	12-12-12	12-24-12	6-12-6	6-8-8	5-10-10	3-9-27	0-12-12	6-12-6			
Arkansas	66,949	9,419	4,074	1,801	4,712	35,289	33,043	6,573	1,744	1,706	58	1,943	10,453	1,186	62	37	11,048	188,068
Louisiana	41,764	20,983	34,027	3,127	29,631	1,749	263	9,945	3,110	3,124	13,992	3,397	0	1,543	400	24	14,307	180,363
Oklahoma	30,350	12,968	1,747	558	973	17	1,201	338	1,764	1,577	0	5,413	0	337	1,664	27	8,334	65,018
Texas	118,979	27,220	24,673	58,892	3,268	325	3	5,394	10,996	8,239	164	3,180	0	5,504	8,944	55	23,700	293,401
Total	256,018	70,590	64,522	61,368	38,584	37,380	34,510	22,250	17,564	14,446	14,214	13,933	10,453	8,570	11,070	92	57,389	726,850
Mountain																		
	10-20-0	10-10-0	10-16-8	12-24-0	14-3-0	10-10-13	10-16-8	8-30-0	10-10-3	6-14-8	16-11-0	14-14-7	7-21-7	6-10-4	12-16-0			
Montana	2,017	0	30	0	0	0	125	392	0	0	0	0	0	342	0	14	373	3,279
Idaho	1,348	4,028	748	0	0	0	316	429	1,226	0	1,644	0	0	16	1,212	20	762	11,617
Wyoming	199	21	15	19	0	0	135	57	46	0	0	4	8	110	0	8	65	671
Colorado	1,223	208	3,995	3,338	0	1,647	1,886	834	331	1,586	0	0	1,164	0	10	38	4,462	20,683
New Mexico	859	222	0	0	0	0	0	0	1	0	0	0	0	58	0	14	400	1,620
Arizona	6,220	7,605	0	0	2,590	925	0	0	362	0	0	1,468	0	2	0	35	5,171	24,343
Utah	904	132	87	0	0	0	182	439	125	0	33	4	25	537	8	19	555	2,679
Nevada	96	0	1	0	0	0	0	0	27	0	0	0	0	302	0	12	218	661
Total	12,862	12,216	4,821	3,355	2,590	2,572	2,643	2,151	2,118	1,586	1,677	1,476	1,196	1,367	1,228	96	11,995	65,253
Pacific																		
	10-10-5	17-7-0	8-8-4	6-10-4	6-10-12	15-8-4	5-10-10	6-9-5	10-16-5	4-11-1	13-10-10	10-12-10	6-20-20	10-10-0	10-20-20			
Washington	1,348	804	0	5,074	0	0	8,111	0	140	0	360	0	1,390	4	1,305	52	8,486	26,722
Oregon	180	0	0	1,336	0	87	2,328	0	5,639	[illegible]	[illegible]	[illegible]	1,792	313	397	80	8,099	20,298
California	31,964	26,110	19,723	10,343	11,386	10,741	0	9,009	0	8,404	3,575	7,424	0	2,158	0	200	81,218	214,353
Total	33,632	26,914	19,723	16,753	11,386	10,828	10,239	9,009	5,779	8,404	3,935	7,424	3,182	2,475	1,702	332	97,803	261,373
Territories 2/																		
	12-6-10	13-3-13	12-6-10	18-6-7	6-8-10	24-2-8	14-4-10	9-10-6	10-10-8	12-6-6	12-6-10	16-4-5	5-10-10	12-3-16	8-10-8			
Puerto Rico	32,389	28,230	27,210	24,722	21,916	9,903	9,312	7,488	7,238	6,190	5,661	4,534	2,796	2,555	2,506	29	9,746	222,193
	10-16-8	10-20-20	8-16-8	10-20-10	5-15-5	10-6-4	10-10-6	8-20-10	7-8-19	---	---	---	---	---	---			
Alaska	26	22	20	20	12	7	5	3	2	---	---	---	---	---	---	0	0	117

1/ The number of mixtures shown for each State and Region is exclusive of mixtures not specified by grade, although their tonnages are included in the totals.

2/ The total consumption in Hawaii was 58,634 tons of mixed goods which were manufactured to consumer's specifications.

tive States of the region. With the exception of Florida and Nevada, these grades represent more than 60 percent of the total mixed fertilizers consumed in each State. Except for these two States and a few Western States, these 15 grades accounted for 80 percent or more of the total State consumption.

The consumption of each class of mixture in the various regions is shown in Table 5. With the exception of the West North Central and Mountain regions, 83 percent or more of all mixtures consumed were N-P-K mixtures. In the Mountain region, N-P mixtures were consumed in the largest amount (60 percent); whereas, in the West North

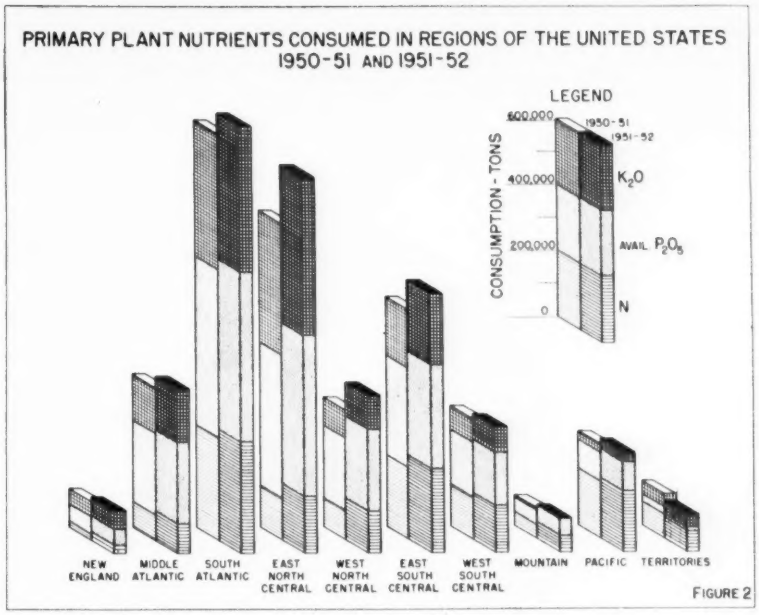


FIGURE 2

Table 6. - Principal fertilizer materials consumed or sold, Year Ended June 30, 1952[1]

Tons

State & Region	Chemical Nitrogen materials					Natural Organics		Phosphates				Potash materials		Total Primary Nutrient Materials	Secondary and Minor Element Materials[2]
									Superphosphates						
	Ammonium Nitrate	Ammonium Sulfate	Calcium Cyanamide	Sodium Nitrate	Other[3]	Dried Manures	Other[3]	Phosphate Rock[3]	18-20 Percent Grades	30-40 Percent Grades	Other[3]	Chlorides 50 & 60 Percent Grades	Other[3]		
Maine	1,814	142	106	286	93	686	172	10	8,071	0	126	26	1	11,002	71
New Hampshire	638	3	2	106	42	128	323	20	6,621	0	29	68	13	8,795	81
Vermont	318	7	8	66	89	72	48	190	10,241	0	366	26	1	17,465	35
Massachusetts	722	271	101	1,284	219	2,340	4,801	208	6,667	0	723	413	0	17,746	85
Rhode Island	79	186	19	120	65	211	706	10	901	1	103	89	3	2,383	11
Connecticut	542	170	74	889	110	1,071	14,409	119	6,900	7	1,230	1,312	961	27,798	891
New England	3,810	781	310	2,750	618	4,677	20,459	554	43,201	8	2,281	2,274	994	82,184	1,174
New York	8,237	808	850	6,798	1,145	4,047	6,436	986	116,106	89	1,819	600	94	147,713	592
New Jersey	2,886	201	1,829	3,266	266	3,346	2,066	371	7,740	1	806	1,354	35	23,654	117
Pennsylvania	3,979	2,374	982	2,334	529	3,696	4,769	3,186	71,977	42	1,396	1,824	531	96,067	972
Delaware	1,333	61	72	440	201	2,061	39	180	1,649	0	51	111	3	6,171	107
District of Columbia	0	0	8	57	0	838	289	0	88	0	150	2	0	810	0
Maryland	1,428	127	619	5,130	1,149	621	267	4,018	14,789	1	441	105	665	29,538	283
West Virginia	318	347	8	1,810	218	221	101	99	23,237	606	87	13	0	26,736	5
Middle Atlantic	17,180	3,918	4,146	19,834	3,508	14,228	13,937	8,789	236,582	739	4,432	3,809	1,111	330,691	2,076
Virginia	8,648	682	1,018	86,321	17,798	571	281	375	38,768	2,351	5,051	1,358	15,196	120,385	8,801
North Carolina	20,624	972	10,136	188,999	78,789	447	1,700	1,129	33,443	1,807	10,426	10,563	13,434	342,269	27,716
South Carolina	18,931	3,606	2,091	91,292	58,427	280	608	1,304	43,948	68	13,289	19,109	8,492	256,268	2,662
Georgia	18,061	2,919	1,818	96,566	35,722	1,028	858	598	33,712	81	26,830	13,068	2,878	233,790	14,114
Florida	6,977	1,586	737	18,358	11,801	882	5,798	18,742	12,726	68	6,261	4,748	10,685	95,984	20,522
South Atlantic	70,218	9,564	15,496	390,525	202,223	3,188	9,245	22,598	169,596	4,152	59,857	48,854	47,685	1,050,674	73,716
Ohio	9,618	8,438	930	2,299	4,433	1,150	7,272	9,427	17,081	3,779	709	736	248	66,020	86
Indiana	43,824	12,101	1,218	1,496	18,386	823	1,682	44,244	18,295	3,280	532	5,258	398	149,014	47
Illinois	26,207	17,418	285	796	19,813	3,006	6,872	646,576	46,813	6,882	4,536	63,316	1,736	842,094	47
Michigan	10,022	5,497	348	1,142	1,252	894	6,452	3,815	20,904	58	1,319	569	0	53,992	412
Wisconsin	9,863	350	61	119	589	3,571	-18,289	2,838	27	6,441	2,854	204	42,698	95,984	210
East North Central	99,134	43,804	2,789	5,764	43,802	6,162	27,569	722,081	103,627	12,876	11,336	72,513	2,585	1,153,772	802
Minnesota	10,065	285	0	1	290	879	2,088	7,985	10,885	16,574	4,256	205	1	52,592	1,622
Iowa	32,011	6,929	110	0	6,398	87	1,507	26,399	53,906	7,325	15,313	2,646	67	149,078	4
Missouri	27,486	6,908	26	548	17,484	1,409	2,088	227,872	16,810	4,754	9,889	11,314	994	329,649	18
North Dakota	353	16	0	2	1	0	18	44	610	6,778	1,855	0	0	9,673	0
South Dakota	1,017	181	0	0	125	23	95	438	2,312	775	990	6	2	5,961	0
Nebraska	23,281	7,949	160	0	7,483	186	879	2,077	4,869	10,491	5,157	4	0	62,596	0
Kansas	26,064	11,070	0	20	2,098	78	380	20,456	16,409	24,998	22,098	250	7	125,104	0
West North Central	119,246	30,636	296	571	34,036	2,622	6,850	284,337	108,301	70,795	59,068	14,425	671	727,743	1,642
Kentucky	30,436	2,893	3,232	2,355	1,769	30	379	25,789	49,046	10,513	9,461	5,062	8,464	147,149	18
Tennessee	48,099	734	1,125	19,134	6,891	497	862	2,874	31,388	9,177	23,492	13,062	2,810	159,537	196
Alabama	41,426	5,810	332	99,781	16,382	442	150	2,719	58,108	2,621	208,038	14,535	2,328	471,549	486
Mississippi	115,621	27,084	4,395	62,354	39,738	18	0	7,488	61,240	4,568	100,261	31,184	83	454,524	1
East South Central	255,832	36,221	9,084	183,586	63,550	994	1,191	38,870	200,380	26,979	341,449	63,843	13,340	1,233,009	700
Arkansas	41,288	9,389	1,470	33,804	10,940	32	32	2,380	44,966	8,539	5,010	15,316	1,006	170,672	1
Louisiana	26,403	6,983	460	31,002	25,982	156	210	4,216	22,573	1,933	24,391	6,072	6	150,247	6
Oklahoma	8,236	2,448	0	367	98	198	363	41,986	40,661	4,106	5,610	5,414	73	107,637	0
Texas	26,836	28,526	1,866	2,944	20,406	2,959	1,133	30,011	127,446	18,086	57,466	1,536	48	313,961	7,222
West South Central	98,841	63,524	3,795	67,907	57,126	3,245	1,738	78,492	236,635	32,664	90,477	28,340	1,133	742,517	7,229
Montana	3,180	3,471	0	0	80	0	116	0	80	11,787	841	8	0	19,802	662
Idaho	6,218	15,038	40	0	99	0	30	580	18,871	15,131	5,199	67	0	67,273	4,342
Wyoming	204	380	0	0	26	0	0	81	1,494	3,777	0	0	0	6,010	78
Colorado	3,635	2,199	0	3	3,226	0	804	0	6,148	9,914	1,743	120	9	26,800	340
New Mexico	1,674	847	0	0	987	20	438	0	2,297	6,325	5,241	3	0	17,560	0
Arizona	11,335	17,254	801	1,718	25,305	2,499	199	0	8,143	3,462	17,578	13	540	84,867	7,297
Utah	3,720	12,180	0	0	18	47	120	68	5,480	4,316	1,421	252	5	27,624	430
Nevada	49	86	0	0	1	0	24	180	711	568	671	0	0	2,302	2,769
Mountain	29,763	49,647	841	1,721	27,821	2,566	1,830	934	40,296	53,300	32,694	463	554	261,736	16,723
Washington	10,785	10,824	120	360	10,849	1,243	3,277	1,849	10,728	6,614	6,157	1,543	22	61,939	2,987
Oregon	17,845	22,781	433	95	6,150	0	901	1,100	18,650	2,659	14,866	1,291	124	86,677	15,535
California	77,004	129,884	6,845	800	118,128	180,000[4]	68,536	1,073	70,189	15,578	78,956	1,332	5,732	747,783	664,965
Pacific	105,614	162,789	8,398	1,255	135,107	181,243	72,712	4,021	99,317	22,848	99,961	4,266	5,878	896,399	681,285
Continental U. S.	799,088	410,883	45,155	681,881	566,886	198,722	165,009	1,168,348	1,222,713	224,061	700,315	238,727	71,791	6,468,747	784,946
Hawaii	0	36,081	0	163	6,037	4	80	1,674	1,454	788	4,339	7,739	1,703	60,062	104
Puerto Rico	0	60,062	98	14	1,279	0	0	0	123	14	89	80	84	61,784	0
Alaska	151	11	0	3	1	0	0	0	0	196	44	60	0	446	0
Territories	151	96,154	98	180	7,317	4	80	1,674	1,577	998	4,472	7,849	1,787	102,272	104
Total: 1951-52	799,189	486,817	45,254	681,761	572,903	198,726	165,089	1,170,020	1,224,290	225,059	704,787	246,576	73,578	6,561,019	785,050
1950-51[5]	838,378	461,901	44,222	663,947	456,911	183,450	135,429	1,039,864	1,535,877	259,725	677,701	189,838	81,882	6,366,743	646,269
1949-50	877,842	434,664	41,878	627,424	284,878	188,219	127,984	749,283	1,756,777	288,188	487,086	109,289	69,610	5,806,197	439,807

1/ Includes materials distributed by Government agencies. Excludes lime and materials used by manufacturers in the formulation of commercial mixtures.

2/ The principal commodities are shown in Table 8, by regions.

3/ Includes colloidal phosphate, the quantity of which is shown separately, by regions, in Table 8.

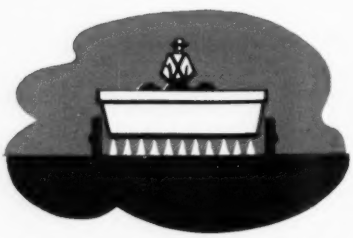
4/ Estimated.

5/ Revised: 1950-51 data for Nevada should read:

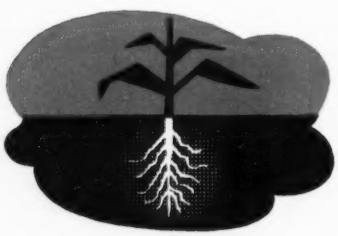
	200	114	0	167	0	0	15	280	49	817	256	0	0	1,797	1,099

DAVISON GRANULATED Superphosphate 3 WAY CONTROL

STORAGE CONTROL—No caking or lumping while in storage.



APPLICATION CONTROL—No dusting or bridging; drills free and even.



FOOD CONTROL—Supplies plant food at a uniform rate.

Now it is possible for you to store superphosphate without fear of its caking . . . that is, if it is DAVCO GRANULATED SUPERPHOSPHATE. DAVCO Granulated Superphosphate will not become hard or caked . . . it is easier to apply in the field because there is no dusting or bridging over in the drill.

DAVCO Granulated Superphosphate gives complete coverage in the field . . . drilling freely and evenly . . . supplying each plant with a uniform quantity of nutrient phosphorus.

Get DAVCO Granulated Superphosphate . . . the superphosphate that gives you the added sales points through its 3-way control.

Progress Through Chemistry

THE DAVISON CHEMICAL CORPORATION

BALTIMORE 3, MARYLAND

PRODUCERS OF: CATALYSTS, INORGANIC ACIDS, SUPERPHOSPHATES, PHOSPHATE ROCK, SILICA GELS, SILICOFLUORIDES AND FERTILIZERS

Bemis makes 'em
where you want 'em

Look at the map. There's a Bemis plant convenient to you, making quality bags of whatever types you want. And there are Bemis representatives—packaging specialists—ready at your call to help you with any packaging problem from plant layout to car-loading. You'll profit by depending on Bemis.

LEGEND

- B Bleachery
- C Cotton Mill
- E Export Office
- I Ink Mill
- M Multiwall Paper Shipping Sacks
- P Packaging Service
- PL Plastic Bags
- P.M. Paper Mill
- P.S. Paper Specialty Plant
- S Sales Office
- S.P. Small Paper Bags
- T Thread and Twine Mill
- Tex Textile Bag Plant and Sales Office
- V Visinet Open-Mesh Mill

Bemis

General Offices—St. Louis 2, Mo.
Sales Offices in Principal Cities

Table 5. - Kinds of Fertilizers Consumed in Regions of the United States, in Tons, During Year Ended June 30, 1952[1]

Kinds	New England	Middle Atlantic	South Atlantic	East North Central	West North Central	East South Central	West South Central	Mountain	Pacific	Territories	Total
MIXED GRADES											
N-P-K	336,132	1,679,928	4,838,266	3,078,696	761,814	1,910,120	636,873	25,997	229,316	267,828	13,964,669
N-P	288	185	1,033	835	184,787	647	16,396	39,118	30,765	1,866	276,586
P-K	66,976	131,624	281,787	316,640	74,101	284,974	75,255	83	1,289	1,170	1,200,999
N-K	0	2	134,919	1,069	10	1,746	27	38	5	7,282	145,096
CHEMICAL NITROGEN MATERIALS											
Ammonia - anhydrous	0	3/	3/	3/	3/	3/	3/	3/	3/	3/	168,273
Ammonia - aqua	0	0	183	83	110	0	1,234	19	18,427	0	20,026
Ammonium nitrate	3,810	17,180	70,218	99,134	119,246	258,832	98,541	29,765	106,614	131	799,189
Ammonium nitrate-limestone mixtures	295	1,479	164,307	28,013	16,618	21,890	5,697	0	219	0	257,817
Ammonium sulfate	781	3,918	9,564	43,804	30,635	36,221	43,824	49,447	192,789	76,134	486,817
Calcium cyanamide	310	4,146	15,496	2,789	296	9,084	3,796	841	8,398	99	45,256
Calcium nitrate	0	0	7,064	872	87	4,909	1,306	4,027	31,109	83	49,456
Sodium nitrate	2,780	19,534	396,523	5,744	571	183,686	67,907	1,721	1,245	180	681,781
Other chemical nitrogen materials[2]	320	2,028	10,869	14,564	18,271	36,761	48,890	23,975	83,352	7,234	77,831[4]
NATURAL ORGANICS											
Blood, dried	0	286	46	89	0	0	0	7	1,214	0	1,644
Castor pomace	2,761	61	2,171	0	0	0	7	0	996	0	5,986
Compost and muck	0	0	416	0	0	0	0	0	0	0	416
Cottonseed meal	10,823	31	1,137	0	0	2	0	0	22	0	12,015
Fish emulsion	0	0	0	0	0	0	0	0	842	0	842
Fish scrap and meal	712	18	17	0	0	0	0	0	433	0	1,178
Hoof and horn meal	200	0	0	0	0	0	0	0	0	0	200
Manures, dried	4,477	14,228	3,185	6,162	2,622	996	5,246	2,566	161,243	4	198,726
Sewage sludge, activated	4,343	9,235	3,823	27,296	6,860	1,189	1,731	1,499	14,674	80	70,819
Sewage sludge, other	0	0	0	0	0	0	0	24	37,567	0	37,591
Tankage, animal	0	760	0	0	0	0	0	0	409	0	1,169
Tankage, garbage	0	1	0	73	0	0	0	0	1,100	0	1,174
Tankage, process	1,103	3,227	1,558	92	0	0	0	0	0	0	5,977
Other[5]	517	330	76	0	0	0	0	0	5,455	0	6,378
PHOSPHORUS MATERIALS											
Ammonium phosphate, 11-48	0	0	0	206	2,886	3	198	1,203	6,819	3,391	14,706
Ammonium phosphate, 16-20	0	0	4	2,713	33,157	70	64,436	24,106	72,581	1,081	198,118
Ammonium phosphate, 13-39	0	0	0	40	14,180	0	4,053	2,731	0	0	21,034
Ammoniated superphosphate	0	0	491	0	0	0	2,557	0	4,210	0	7,258
Basic lime phosphate	0	145	198	0	0	1,374	0	0	0	0	1,714
Basic slag	0	70	52,736	19	0	320,314	18,635	0	0	0	391,774
Bonemeal, raw	886	2,174	1,088	336	72	104	230	0	2,317	0	6,886
Bonemeal, steamed	1,394	2,041	281	769	8	208	0	0	62	0	4,756
Calcium metaphosphate	0	0	3,086	6,644	6,107	8,451	297	0	189	0	24,774
Fused tricalcium phosphate	0	0	1,799	590	1,650	10,930	0	0	0	0	14,969
Phosphoric acid: 20-85% P_2O_5	0	0	0	0	0	0	41	4,854	13,813	0	18,508
Phosphate rock	474	6,224	21,212	711,359	271,649	24,049	77,481	714	4,021	1,674	1,118,857
Colloidal phosphate	80	2,686	1,588	10,692	12,688	12,821	1,011	220	0	0	41,183
Precipitated bone	291	0	0	0	0	0	0	0	0	0	291
Superphosphate, 18%	1,942	31,736	76,460	27,997	12,376	52,010	880	4,332	75,367	0	282,944
" 19%	169	1	3,770	82	4,061	1,311	16,061	32,896	23,928	0	82,288
" 20%	41,090	303,825	79,860	75,624	68,980	147,069	218,704	3,067	2	1,677	859,088
" 30%	0	0	0	0	797	0	3,655	184	0	787	5,423
" 38%	0	0	0	36	17	0	5	0	0	0	59
" 42%	0	0	0	0	21,720	0	0	40,173	5,294	0	67,187
" 43%	0	0	0	0	0	0	9	0	46	0	46
" 44%	1	608	1	5,899	14,666	2,838	23,486	8,298	16,558	211	72,844
" 46%	0	101	0	3,868	21,167	3,068	1,508	3,201	629	0	33,582
" 47%	7	30	146	1,948	4,736	7,297	752	1,004	321	0	16,240
" 48%	0	0	2,399	648	7,293	12,969	1,328	40	0	0	24,677
" 49%	0	0	1,807	57	62	729	1,673	400	0	0	4,728
" 50%	0	0	0	0	337	60	177	0	0	0	574
POTASSIUM MATERIALS											
Cement flue dust	0	587	23,639	0	0	500	0	0	0	0	24,726
Cotton hull ash	695	1	0	3	0	0	0	0	0	0	699
Manure salts: 22-30% K_2O	0	115	5,583	1,308	2	168	460	0	0	0	8,531
Potassium carbonate	0	0	148	0	0	0	0	0	0	0	148
" chloride: 50% K_2O	90	688	58,466	29,458	762	36,881	17,413	13	1,825	0	122,545
" " 60% K_2O	2,184	3,144	12,568	43,065	13,683	27,962	10,928	640	2,441	7,849	124,031
" magnesium sulfate	79	126	2,064	814	342	1,096	611	0	0	749	5,873
" nitrate	0	0	5,919	0	0	0	0	0	0	0	5,919
" phosphate ash	0	0	1,563	0	0	725	0	0	0	0	2,288
" sodium nitrate	18	29	215	0	227	1,546	0	540	0	0	2,571
" sulfate	204	122	8,538	480	0	9,548	61	14	3,975	1,008	20,433
Tobacco stems	0	121	1,808	2	0	0	0	0	0	0	1,931
Wood ashes	0	10	3,519	0	0	0	1	0	0	0	3,529
Total primary nutrient fertilizers	484,580	2,042,413	5,106,668	4,581,012	1,746,155	3,400,516	1,469,187	306,971	1,167,772	380,117	21,547,368
SECONDARY & MINOR ELEMENT MATERIALS[6]											
Aluminum sulfate	4	58	1	8	0	0	0	0	0	0	69
Borax	64	174	227	331	0	250	7	18	302	0	1,363
Calcium sulfate	1,018	1,877	53,113	40	1,502	440	0	15,046	663,966	0	736,700
Copper sulfate	11	86	5,116	107	0	0	0	0	20	0	5,338
Ferrous sulfate	0	0	0	0	0	0	0	14	0	0	14
Magnesium carbonate	0	0	0	0	0	0	0	0	1,070	0	1,070
Magnesium sulfate	85	21	0	29	0	0	0	0	4	6	144
Manganese sulfate	2	58	8,167	266	24	0	0	0	326	0	8,845
Sulfur: 98-99+%	2	68	4,256	11	0	0	1,465	636	5,506	0	11,939
Sulfuric acid: 40-93%	0	0	0	0	0	0	0	0	6,909	0	6,909
Zinc sulfate	0	11	1,911	8	0	10	0	2	30	99	2,068
Minerals not classified	0	27	926	8	18	0	6,457	7	3,153	0	10,591
Total Sec. & Minor Elem. Mat.	1,174	2,076	73,718	802	1,542	700	7,929	15,725	681,285	104	785,060
TOTAL ALL FERTILIZERS	485,754	2,044,488	5,180,383	4,581,814	1,749,697	3,401,216	1,477,098	322,694	1,839,367	380,221	22,432,418

1/ Includes distribution by Government agencies. Does not include materials for manufacture of commercial fertilizers.

2/ Included with "Other Chemical Nitrogen Materials." Regional data cannot be published without disclosing operations of individual suppliers.

3/ Anhydrous ammonia, ammonium sulfate-nitrate, nitrogen solutions, urea, and unsegregated chemical nitrogen materials.

4/ Does not include above total for anhydrous ammonia.

5/ Miscellaneous seed meals: Linseed (182), Peanut (81), Soybean (382), Tung (15), and unsegregated organics (5788).

6/ Excludes materials distributed by other than manufacturers of fertilizers.

Table 6. - Consumption of Primary Plant Nutrients in Fertilizers, Year Ended June 30, 1952[1/]

Tons

State & Region	In Mixtures					In All Fertilizers				
	Nitrogen	P_2O_5		K_2O	N, Avail. P_2O_5, & K_2O	Nitrogen	P_2O_5		K_2O	N, Avail. P_2O_5, & K_2O
		Available	Total				Available[2/]	Total[3/]		
Maine	12,206	21,681	22,566	25,917	59,803	12,804	23,342	24,263	25,954	62,100
New Hampshire	561	1,629	1,734	2,109	4,299	793	2,586	2,735	2,155	5,534
Vermont	1,035	5,188	5,376	5,803	12,026	1,186	8,579	9,030	6,035	15,300
Massachusetts	3,581	7,077	7,406	7,744	18,482	4,649	8,745	9,216	8,099	21,493
Rhode Island	716	1,443	1,528	1,462	3,611	876	1,647	1,743	1,506	4,029
Connecticut	3,138	5,064	5,781	5,554	13,756	4,575	7,239	8,080	6,926	18,740
New England	21,316	42,082	44,391	48,579	111,977	24,983	52,138	55,067	50,665	127,686
New York	25,184	55,085	57,543	41,607	121,976	30,360	79,289	82,960	42,128	181,777
New Jersey	11,834	25,908	27,094	23,224	60,966	14,123	27,611	29,035	24,115	65,360
Pennsylvania	22,614	69,562	72,256	51,699	143,875	25,299	85,096	89,222	52,918	163,213
Delaware	3,086	8,160	8,499	7,506	18,741	3,771	8,561	8,964	7,612	19,944
District of Columbia	89	179	182	114	382	125	243	249	124	492
Maryland	10,117	30,771	32,715	23,014	63,902	12,112	34,002	37,039	23,138	69,252
West Virginia	2,014	9,697	10,416	6,901	18,612	2,512	14,827	15,801	6,913	24,252
Middle Atlantic	74,937	199,252	208,705	154,065	428,254	88,302	249,629	263,270	156,849	494,780
Virginia	21,687	83,336	88,823	69,380	174,402	33,887	93,422	99,212	71,308	198,617
North Carolina	57,378	154,649	166,378	125,642	337,669	109,161	163,434	178,723	133,185	405,780
South Carolina	26,757	71,346	76,625	56,921	155,024	61,157	81,422	87,455	68,924	211,503
Georgia	42,556	93,206	101,177	81,064	216,526	74,510	102,856	111,627	88,793	266,159
Florida	48,023	69,989	84,862	72,421	190,433	57,233	74,033	94,500	77,701	208,967
South Atlantic	196,401	472,525	517,865	405,428	1,074,354	335,948	515,167	568,517	439,911	1,291,026
Ohio	31,459	121,544	130,348	113,639	266,542	39,131	127,369	139,164	114,098	280,698
Indiana	30,455	116,931	125,143	122,920	270,306	53,046	123,274	144,264	125,906	302,226
Illinois	22,360	71,896	77,062	80,882	175,138	43,671	104,526	297,089	118,134	266,331
Michigan	16,793	71,638	76,310	64,319	152,750	22,522	76,919	82,849	64,708	164,149
Wisconsin	9,984	50,336	53,470	55,311	115,801	13,535	54,331	62,688	56,808	124,674
East North Central	111,021	432,345	462,333	436,971	980,537	171,905	486,419	726,084	479,654	1,137,978
Minnesota	6,539	33,795	35,346	23,958	64,292	10,532	45,453	49,405	24,099	80,084
Iowa	12,916	44,833	47,004	22,564	80,313	24,806	64,165	74,081	24,111	117,102
Missouri	20,951	63,784	68,911	42,066	126,801	41,384	79,271	150,289	48,760	169,916
North Dakota	1,080	6,563	5,686	1,560	8,203	1,356	9,515	9,790	1,560	12,431
South Dakota	372	1,096	1,232	146	1,614	906	2,073	2,382	150	3,129
Nebraska	3,365	6,039	7,086	449	10,653	16,916	14,124	15,042	458	31,498
Kansas	6,600	17,029	18,014	2,790	26,419	21,636	38,650	46,020	2,946	63,252
West North Central	51,823	172,939	183,279	93,533	316,295	122,030	253,271	340,949	102,084	477,391
Kentucky	17,092	52,654	57,364	42,525	112,271	29,800	72,406	84,362	49,332	161,538
Tennessee	16,925	49,102	53,074	39,606	105,633	40,345	64,553	69,882	47,973	152,671
Alabama	36,005	87,236	94,104	66,252	185,493	78,753	120,521	131,703	76,064	274,338
Mississippi	20,674	35,625	38,373	25,402	81,661	101,361	60,656	67,191	41,838	203,855
West South Central	90,596	224,617	242,915	173,845	489,058	250,259	318,136	353,138	214,207	782,602
Arkansas	9,367	19,412	20,804	21,288	50,067	38,578	33,214	35,636	29,698	101,490
Louisiana	10,278	20,094	21,432	14,682	45,054	42,842	28,670	31,720	19,058	90,570
Oklahoma	3,431	7,866	8,406	3,767	15,163	7,712	20,860	33,818	5,757	34,329
Texas	14,272	35,666	37,688	19,449	69,407	50,789	82,934	94,842	20,439	154,202
West South Central	37,348	83,157	88,330	59,186	179,691	139,921	165,718	196,014	74,952	380,591
Montana	303	651	722	46	1,000	2,262	5,967	6,428	51	8,260
Idaho	1,305	1,867	1,715	165	3,037	6,937	12,517	13,204	200	19,654
Wyoming	63	120	128	19	202	226	2,162	2,744	19	2,409
Colorado	1,995	4,052	4,176	1,155	7,202	6,384	10,359	10,625	1,237	17,960
New Mexico	139	258	265	45	442	2,055	4,951	5,063	49	7,055
Arizona	2,754	3,437	3,618	442	6,633	25,030	11,604	11,916	572	37,206
Utah	229	450	473	80	759	4,280	3,769	3,951	236	8,254
Nevada	48	77	82	27	152	194	593	656	27	814
Mountain	6,836	10,612	11,181	1,979	19,427	47,340	51,922	54,685	2,390	101,652
Washington	1,823	3,270	3,610	2,726	7,819	15,815	9,215	10,318	3,764	28,794
Oregon	1,653	2,920	3,126	1,829	6,402	17,280	11,295	12,173	2,648	31,193
California	21,852	20,129	21,586	11,588	53,569	152,742	67,030	70,174	18,274	238,046
Pacific	25,328	26,319	28,322	16,143	67,790	185,807	87,540	92,665	24,686	298,033
Continental U. S.	615,606	1,663,848	1,787,321	1,389,729	3,569,183	1,366,401	2,179,940	2,655,799	1,545,398	5,091,739
Hawaii	5,715	4,744	5,120	9,096	19,555	16,930	7,170	8,074	14,405	38,505
Puerto Rico	26,892	12,094	14,063	21,558	60,544	41,384	12,144	14,113	21,616	75,144
Alaska	10	19	19	15	41	65	122	124	48	235
Territories	32,617	16,857	19,202	30,669	80,140	58,379	19,436	22,311	36,069	113,884
Totals 1951-52	648,223	1,680,705	1,806,523	1,420,395	3,649,323	1,424,780	2,199,376	2,678,070	1,581,467	5,205,623
1950-51[4/]	583,959	1,541,863	1,667,426	1,254,927	3,380,749	1,236,977	2,109,900	2,536,988	1,379,813	4,726,690
1949-50	495,360	1,344,298	1,446,118	1,018,174	2,857,829	1,009,482	1,949,768	2,290,081	1,103,062	4,068,282

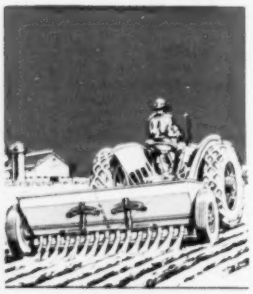
1/ Includes Government distribution.

2/ Includes, as available P_2O_5, 2 percent of the colloidal phosphate and 3 percent of the phosphate rock marketed for direct application.

3/ Includes, as total P_2O_5, 22 percent of the colloidal phosphate and 32 percent of the phosphate rock marketed for direct application.

4/ Revised.

MINERAL SALTS



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Central region such mixtures, though consumed in a large amount were only 18 percent of the total as compared with 74 percent for N-P-K mixtures. The relative proportions of the classes consumed in the Continental United States has not changed greatly over many years. In 1941 (2), they were, N-P-K 92 percent, P-K 6 percent, N-K 1 percent, and N-P less than 1 percent. In 1951-52, they were 89, 8, 1, and 2 percent respectively.

The weighted average primary nutrient content of all mixed fertilizers consumed in each State is shown in Table 7. The national average for all mixtures increased from 24.19 percent in 1950-51 to 24.86 percent in 1951-52. This average, in 1951-52, comprised, nitrogen 4.30, available P_2O_5 11.14, and K_2O 9.42 percent. The values for these nutrients respectively were 0.12, 0.11, and 0.44 higher than in 1950-51. Although the national average for each nutrient increased over that for 1950-51, changes by States and Territories showed variations. The average for nitrogen increased in 40 of these areas, decreased in 9, and in 3 there was no change. The available P_2O_5 increased in 18 and decreased in 34, while K_2O increased in 44 and decreased in 8. The national average reflected the general trend in the change in composition of mixed fertilizers during the past years. In 1943-44 (3), the average nutrient content of all mixed fertilizers was 20.84 percent, comprising 3.71 for nitrogen, 10.38 for available P_2O_5, and 6.75 percent for K_2O. In this survey the values for these nutrient contents were, nitrogen 4.30, available P_2O_5 11.14, and K_2O 9.42, a total of 24.86 percent. These respective nutrients were 15.9, 7.3, 29.6, and the total 19.3 percent greater than in 1943-44.

Table 7. - Weighted Average Content of Primary Plant Nutrients in Fertilizers, in Percent, Year Ended June 30, 1952[1]

State & Region	Mixtures[2]				Materials					Total Nutrients in Mixtures and Materials
					Single Nutrient[3]			Multiple Nutrients[4]		
	N	Available P_2O_5	K_2O	Total Nutrients	N	Available P_2O_5[5]	K_2O		Total Nutrients	
Maine	6.06	10.76	12.86	29.58	29.25	19.93	58.36	10.73	20.58	29.23
New Hampshire	5.70	10.75	13.92	28.37	29.89	20.72	61.18	9.26	21.32	26.43
Vermont	2.68	13.42	15.02	31.12	30.19	20.59	58.34	12.84	21.61	28.16
Massachusetts	4.93	9.53	10.45	24.89	21.34	19.52	60.20	10.01	16.91	23.35
Rhode Island	4.99	10.06	10.12	26.17	16.70	19.87	51.74	11.41	17.84	24.09
Connecticut	5.36	8.85	9.49	23.50	20.62	20.32	52.27	11.36	17.93	21.70
New England	5.30	10.46	12.07	27.33	23.55	20.37	54.02	10.22	19.11	26.35
New York	6.18	11.32	8.56	25.06	24.31	20.20	57.95	10.13	20.24	23.93
New Jersey	4.91	10.71	9.84	25.26	23.18	18.35	58.50	10.55	20.89	24.86
Pennsylvania	3.90	12.25	9.10	26.35	23.53	20.02	54.16	10.82	20.13	24.58
Delaware	4.16	11.00	10.13	25.29	28.27	18.59	61.23	8.38	19.49	24.34
District of Columbia	6.14	10.34	6.59	23.07	16.25	20.75	62.60	12.24	13.58	19.36
Maryland	3.78	11.61	8.61	23.90	22.73	16.63	54.62	14.67	18.24	23.34
West Virginia	2.76	13.26	9.46	25.45	20.25	21.33	53.33	10.26	21.09	24.28
Middle Atlantic	4.38	11.64	9.00	25.02	23.69	19.92	49.83	10.53	20.12	24.23
Virginia	2.93	11.27	9.38	23.58	19.77	23.57	11.31	26.36	20.11	23.09
North Carolina	3.65	9.94	8.00	21.49	19.16	18.72	51.35	11.10	19.90	21.21
South Carolina	3.72	9.93	7.92	21.57	19.65	17.14	48.92	34.72	21.87	21.66
Georgia	4.04	8.85	7.70	20.59	20.66	16.84	49.38	19.74	21.10	20.88
Florida	4.93	7.19	7.44	19.56	22.15	10.04	54.16	22.39	19.31	19.54
South Atlantic	3.88	9.38	8.02	21.28	19.80	17.04	37.36	22.44	20.62	21.14
Ohio	3.20	12.36	11.54	27.10	27.97	17.91	50.93	10.07	21.22	26.74
Indiana	3.26	12.82	13.16	29.24	29.18	9.30	52.52	9.69	21.42	27.90
Illinois	3.77	12.14	13.66	29.57	31.74	4.63	57.11	15.26	10.83	18.57
Michigan	3.15	13.36	11.99	28.47	28.63	19.30	58.18	9.81	21.13	27.90
Wisconsin	2.84	14.36	15.76	32.96	33.27	18.10	51.45	9.33	21.26	31.68
East North Central	3.27	12.73	12.86	28.86	30.01	6.18	56.48	11.59	13.66	25.00
Minnesota	3.82	19.74	13.99	37.55	33.16	29.91	56.34	24.71	30.16	35.82
Iowa	4.65	16.14	8.12	28.91	31.50	17.88	57.67	36.34	24.68	27.43
Missouri	4.90	14.91	9.83	29.64	36.49	8.63	56.88	25.99	13.26	22.56
North Dakota	6.03	25.90	7.26	39.19	32.74	44.33	--	42.65	43.71	39.91
South Dakota	6.60	19.46	2.59	28.65	31.54	23.59	48.80	32.57	26.76	27.70
Nebraska	10.67	21.49	1.41	38.46	32.66	33.00	60.50	38.16	33.30	33.35
Kansas	7.90	20.13	3.30	31.23	30.65	24.48	59.08	43.56	29.90	30.44
West North Central	5.08	16.95	9.17	31.20	33.62	14.13	57.06	37.26	21.80	27.31
Kentucky	3.54	10.90	8.80	23.24	31.39	21.26	60.35	10.93	26.69	24.05
Tennessee	3.82	11.08	8.93	23.83	30.81	22.92	55.09	17.56	29.65	26.36
Alabama	4.14	10.02	7.61	21.77	23.25	12.22	56.39	28.03	17.98	20.44
Mississippi	5.55	9.60	6.86	22.01	34.42	14.36	51.41	29.28	26.87	24.69
East South Central	4.18	10.36	8.02	22.56	29.06	15.40	53.36	21.06	23.61	23.02
Arkansas	4.98	10.32	11.32	26.62	30.14	23.81	51.31	37.71	30.13	28.29
Louisiana	5.71	11.16	8.16	25.03	35.52	15.74	54.12	29.30	30.29	27.42
Oklahoma	6.28	12.78	5.79	23.32	30.27	13.22	56.86	38.16	17.81	19.88
Texas	4.86	12.16	6.63	23.66	36.17	19.76	59.09	38.72	27.01	25.36
West South Central	5.14	11.94	8.16	24.73	33.72	18.26	53.26	35.42	27.06	25.51
Montana	9.24	19.86	1.41	30.50	27.07	43.36	60.60	34.34	37.35	36.35
Idaho	11.23	13.49	1.42	26.14	24.96	29.76	60.56	39.21	29.01	28.22
Wyoming	9.39	17.68	2.03	30.10	27.68	37.68	--	--	36.72	36.06
Colorado	9.69	19.69	5.41	34.99	46.47	37.97	61.67	26.42	40.41	38.04
New Mexico	9.18	16.57	2.96	29.06	34.48	19.89	60.50	37.18	37.63	37.12
Arizona	11.31	14.12	1.82	27.25	36.68	35.18	60.50	34.57	36.02	34.07
Utah	8.88	17.46	3.10	29.44	28.74	30.67	59.58	33.76	47.13	47.39
Nevada	7.49	12.01	4.21	23.71	24.88	26.03	--	35.22	28.76	27.61
Mountain	10.49	16.27	3.03	29.78	32.61	34.76	60.28	36.38	34.01	33.11
Washington	6.82	12.24	10.20	29.26	40.11	28.36	59.28	24.61	33.66	32.46
Oregon	8.14	14.39	9.01	31.54	26.06	22.10	57.89	36.88	26.60	29.16
California	10.19	9.39	5.41	24.99	34.12	28.01	52.00	13.50	24.67	24.74
Pacific	9.69	10.47	6.18	26.94	32.27	26.74	54.48	16.06	25.69	25.74
Continental U. S.	4.16	11.24	9.38	24.78	27.99	14.71	49.78	20.72	22.02	23.55
Hawaii	10.29	8.84	16.38	35.21	25.25	14.90	56.25	53.90	31.86	33.32
Puerto Rico	12.10	8.44	9.70	27.24	34.93	23.06	55.24	36.00	34.94	28.47
Alaska	8.88	16.24	10.28	35.04	32.25	47.74	60.86	36.36	43.60	41.74
Territories	11.74	6.07	11.04	28.85	30.04	16.68	56.26	53.38	32.99	29.86
U. S. Average:										
1951-52	4.30	11.14	9.42	24.86	28.06	14.71	49.98	20.57	22.20	24.05
1950-51	4.18	11.03	8.98	24.19	--	--	--	--	21.14	23.23
1943-44	4.02	10.93	8.29	23.24	--	--	--	--	21.41	22.67

1/ Includes materials not guaranteed to contain N, P_2O_5, or K_2O.
2/ Guaranteed to contain two or more of the primary plant nutrients, N, P_2O_5, or K_2O.
3/ Guaranteed to contain one of the primary plant nutrients. Includes ammonium nitrate, superphosphate, potassium chloride, etc.
4/ Guaranteed to contain two or more of the primary plant nutrients. Includes potassium nitrate, ammoniated superphosphate, ammonium phosphates, some organic materials, etc.
5/ Includes the available P_2O_5 content of colloidal phosphate and phosphate rock as 2 percent and 3 percent, respectively.

Table 2a — Principal Ratios of Primary Nutrients of Mixed Fertilizers Consumed in the Continental U. S. Year Ended June 30, 1952.

Ratio	Consumption[1]	Proportion of Quantity of All Mixed Fertilizers
	Tons	Percent
0-1-1	784,797	5.30
1-1-1	572,168	3.86
1-2-1	1,025,841	6.93
1-2-2	1,709,354	11.54
1-3-2	1,024,571	6.92
1-3-3	501,610	3.39
1-4-2	756,126	5.10
1-4-4	2,541,223	17.16
1-6-3	512,083	3.46
2-4-3	534,118	3.61
2-5-3	622,084	4.20
4-10-7	508,254	3.43
Total	11,092 229	74.90

[1] Includes all grades having these ratios.

Materials

Table 4. shows the principal materials consumed in the agriculture of each State while in Table 5, the various kinds of fertilizers so consumed are shown for each region. Quantities of materials used in the manufacture of mixtures are not included.

A slight change was made in these

tables from those of former years. The quantities of secondary and minor element materials were taken out of the totals (Table 4) and are shown separately for each of the States. In Table 5, though shown separately, they are included in the grand totals for each of the regions. This has been done to show more clearly the trends in consumption of materials that contain only the primary plant nutrients.

The classes of materials consumed were, in order of their proportions, phosphates 3,314,156 tons (45.1 percent), chemical nitrogen materials 2,582,924 tons (35.1 percent), secondary and minor element materials 785,050 tons (10.7 percent), natural organics 343,815 tons (4.7 percent), and potassium materials 320,124 tons (4.4 percent).

The principal net changes in consumption from 1950-51 in chemical nitrogen materials were the increases in anhydrous ammonia (42.1 percent), ammonium nitrate—limestone mixtures (33.8 percent), and ammonium nitrate (25.2 percent) while calcium cyanamide decreased 34.2 percent. Consumption of normal and concentrated superphosphates was 20.2 and 6.1 percent less than in 1950-51, respectively. Consumption of the other phosphate materials were lower than in 1950-51 in about one-half of the States while their use was greater in the remaining States. A net increase in consumption approximating 5 percent resulted. Consumption of the principal potassium materials, potassium chloride, 50 and 60 percent grades, and postassium sulfate, were 10.8, 56.6, and 9.2 percent greater than in 1950-51, respectively. In comparison with changes in other regions, the rate of increase for chemical nitrogen materials was highest in the East North Central region; for natural organics and phosphates, in the Mountain region; and for potassium materials in the West North Central region. Decreases in consumption occurred in some regions. The highest decrease in chemical nitrogen materials was in the Territories; for natural organics, in the South Atlantic region; and for phosphate and potassium materials, in the New England region.

The weighted average content of primary nutrients in materials is given, for the first time, by States, in Table 7. These averages are based on the composition and amount consumed, in the State, of the individual materials coming within the class. The data show the average quality of the materials composing the class that are used for direct application in the agriculture of each State. The national average, in percent, for materials that contain only nitrogen was 28.06, those containing only P_2O_5 14.71 (available P_2O_5); only K_2O, 49.98; and those having more than one nutrient 20.97.

Primary Plant Nutrients

Table 6, shows the consumption of primary plant nutrients, by States, while Figure 2, shows the total tonnage consumed in each region in comparison with consumption in 1950-51. These values are based on the amounts of fertilizer reported herein and their average analysis as found by the fertilizer control officials of the respective state in which these fertilizers were consumed. The national consumption of primary nutrients during the year ended June 30, 1952, was nitrogen 1,424,780; available P_2O_5 2,199,376 (total P_2O_5 2,678,070); and K_2O, 1,581,467 tons. These quantities represented net increases over 1950-51 in nitrogen of 187,803 tons, available P_2O_5 89,476 tons, (total P_2O_5 141,082 tons), and K_2O 201,654 tons. Consumption of primary nutrients was, therefore, 15.2, 4.2, (5.6), and 14.6 percent greater than in 1950-51, respectively.

The amounts and proportions of the total quantity of nutrients consumed through mixed fertilizers were 648,223 tons or 45.5 percent of the nitrogen, 1,680,705 tons (76.4 percent) of the available P_2O_5, 1,806,523 tons (67.4 percent) of the total P_2O_5, and 1,420,395 tons (89.8 percent) of the K_2O. In 1951-52, the amounts consumed in mixed fertilizers were for nitrogen 11.0, available P_2O_5 9.0, total P_2O_5 9.0, and K_2O 13.2 percent greater than in 1950-51. While the amounts of nutrients consumed in materials were 18.9 and 29.0 percent greater for nitrogen and K_2O, respectively, they were 8.7 and 0.9 percent less, for available P_2O_5 and total P_2O_5, respectively, than in 1950-51. Total primary nutrients consumed in 1950-51 and in 1951-52 were 4,726,690 tons and 5,205,623 tons, respectively, a net increase of 478,933 tons or 10.1 percent in comparison with the increase of 6.4 percent for tonnage of fertilizers containing these nutrients.

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Last Minute NFA Program Changes

Since our last-month publication of the program of the National Fertilizer Convention, to be held June 15-17 at The Greenbriar, two changes have been made in the speakers. Dr. Frank W. Parker, who has resigned his present post to become Chief Agriculturalist of the Technical Cooperation Administration, USDA and advisor to the Minister of Food and Agriculture in India, cannot be present. His place will be taken by Dr. O. J. Kelley, head of the division of Soil Management-Irrigation and Dry Land Regions, USDA.

An addition to the program is Rep. Charles A. Halleck, Republican from Indiana and Majority Leader in the 83rd Congress. He will talk on "Under New Management in Washington" the morning of June 16.

Hugh Comer, who was originally scheduled for Tuesday, will speak Wednesday morning instead.

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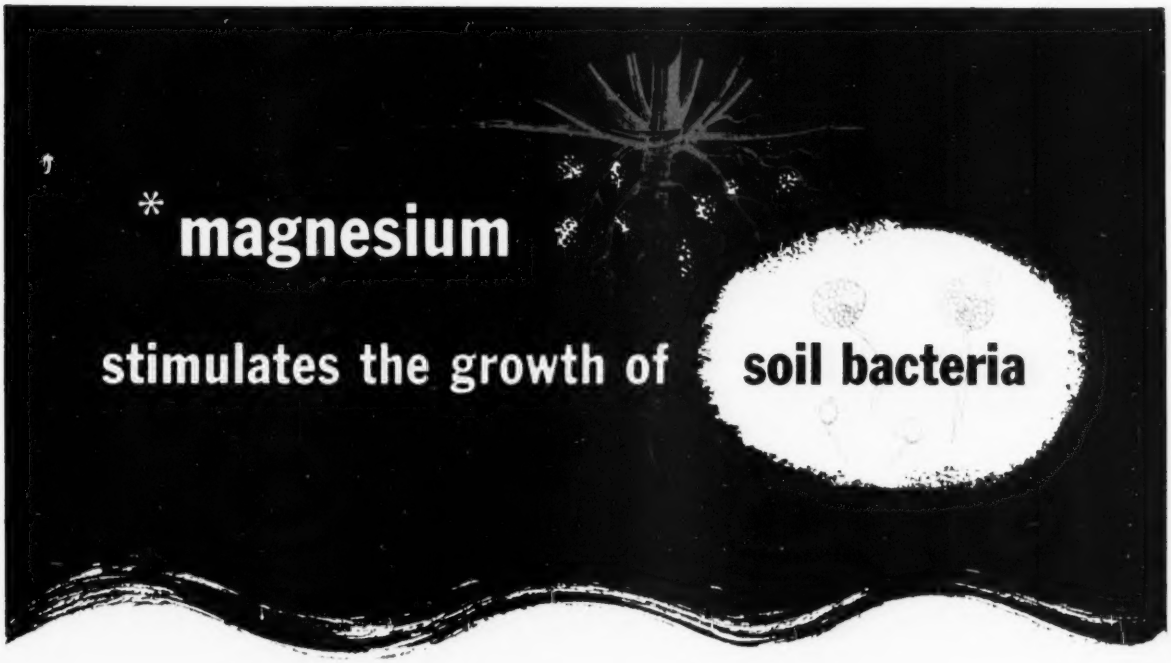

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LOCAL LEVEL PLANT FOOD EDUCATIONAL SOCIETIES

S. C. Celebrates 3rd Birthday

It may be helpful to others who project the formation of a state level plant food educational society to know something of what is being done by the pioneer, the first of these—the South Carolina Plant Food Educational Society. This group was incorporated in June, 1950, and is celebrating its third birthday this month.

Expressed briefly, its objective is the promotion of more efficient use of plant food in South Carolina . . . for more farm income and better farm living. This is accomplished by the dissemination of useful and practical information on all forms of plant foods, better cultural practices and other related information which will result in production of better crops and increased farm income.

One means by which this is done is a series of nine folders, which have been prapared by the Society and which are distributed wherever they will serve the objectives of the group. One of these is captioned "The Good Old Days?"—and the question mark tells the story—because, the folder points out, "we live in better days."

"At the Foot of the Rainbow" is another, which shows that wealth can be found in the furrows of cotton, corn, tobacco or grain fields, provided the farmer accepts the challenge and rebuilds his soil . . . to make his pot of gold a reality.

"When your ship comes in" concerns the city of Ur, mentioned in the Bible as a prosperous seaport, but now 150 miles inland because overgrazing and forest destruction loosed the sands that cut it off from the sea. The rest carries the same moral as "The Lesson of Timgad" which appeared in our April issue—and which, by the way, would make an excellent reprint for use by plant food educational groups.

"Partners for Profits are Fertilizers and Lime" tells the background of the title statement, speaks of the work at Clemson, gives a table of the lime requirements of South Carolina crops. Other folders in the series are titled "I build for you, my Son"—strong mankind develops from a strong soil . . . "The Northern end of a Southbound Mule"—machinery lightens the burdens of labor . . . "Weeds . . . Silent Thieves" . . . "To be Safe is to be Sure" the written guarantee with every bag . . . "Seek and ye shall Find"—keep an open mind.

Pullman, Pleasant Convention Site

Pullman, Washington, where the Pacific Northwest Plant Food Association assembled June 30-July 2 (program for which we published here last month) is a pleasant community, and very proud of the State College, site of the meeting, which is in many ways the heart of the community. Pullman was founded in 1875, and secured the College in 1892. They list their "major industries" as education and agriculture . . . which makes it an ideal place for the Plant Food Meeting.

This is the Wilson-Compton Union building, on the campus of Washington State College, Pullman, where at the end of this month the Pacific Northwest Plant Food Association will begin its Fourth Annual Regional Fertilizer Conference.

Alabama May Have Plant Food Society

The Summer session of the Alabama Fertilizer Conference, to be held in Dothan June 4-5 is likely to discuss the proposal, which has been in the wind for some time, to form an Alabama Plant Food Educational Society.

Louisiana Committee To Report On Local Society

When the Louisiana Fertilizer Conference assembles June 30th in Baton Rouge, a report will be made by a committee appointed for the purpose, and which has been giving the matter study, on the proposed plan to form a Louisiana Plant Food Educational Society.

Send Us Story of Your Society

200 TURN OUT FOR CFA CONFERENCE

The First Annual California Fertilizer Conference, held in Marysville, California on May 7 and 8, saw more than 200 persons in attendance. They came from all sections of California, and from Oregon, Washington, British Columbia, Idaho, Nevada, Arizona and Washington, D. C., and were representative of the fertilizer industry, the University of California, the Soil Conservation Service, agriculture, farm equipment dealers, etc.

The Conference was sponsored by the California Fertilizer Association and the University of California Agricultural Extension Service. Plans are now developing for next year's event in another area of the State, according to S. B. Tatem, President of the California Fertilizer Association.

The Extension Service of Yuba, Sutter and Butte Counties developed the program for May 7, which was presented under the direction of Dr. William E. Martin, Extension Soils Specialist of Berkely. Information was presented which points up many of the problems encountered in the search for complete knowledge regarding soil management, particularly fertilization. It was reported that there were 14 different soil series with 27 variations in Sutter and Yuba Counties alone. Annual rainfall varies from 20 to 70 inches. Ninety different crops are grown commercially in the two-county area, which fall within four general crop classifications. It was reported that most row crop and fruit growers find it profitable to fertilize, following a regular schedule, but that alfalfa and improved pastures are sometimes neglected. Crop rotation programs are beneficial, but it was pointed out that bean yield has been dropping off in recent years, and research is going forward to determine the proper fertilizer combination to reverse the trend. It was also pointed out that soil fertility problems constantly change; for example, potash was not a required element for almonds 25 years ago, but recently, some areas have become deficient in potash. Response to potash is apparent in almond trees during year of application on shallow soils, but does not show until the second year in the deep Chico area soils. In both cases the residual effect lasts 4 or 5 years.

Papers were presented by Farm Advisors of the three counties on crop systems and soils, fertilizer results with fruit trees, with rice, with grain, with alfalfa, and with range and pasture fertilization. The afternoon of May 7 was devoted to a field tour of fertilized test plots, during which improved pastures were examined.

The May 8 program was under the sponsorship of the Soil Improvement Committee of the California Fertilizer Association, with J. H. Nelson of Stockton presiding. Mr. Nelson is chairman of the sub-committee on joint meetings of the Association and the University. This program was devoted to reports on fertilizer research of statewide nature. Technicians of the University, the Soil Conservation Service and the fertilizer industry participated. M. E. McCollam, American Potash Institute, San Jose, Chairman of the Soil Improvement Committee, outlined the objective of his Committee.

Dr. L. D. Davis, Professor of Pomology, University of California at Davis, presented an interesting outline of the role of mineral fertilizers in plant growth. Dr. D. G. Aldrich, Jr., Department of Soils and Plant Nutrition, Citrus Experiment Station, Riverside, reported on fertility research at that institution. Dr. W. E. Martin, Extension Soils Specialist, Agricultural Extension Service, Berkeley, presented two papers, one on the general soil fertility activities of the Extension Service and the other on fertility tests in pots as diagnostic tools. Leonard R. Wohetz of the Soil Conservation Service, Oakland, spoke on "Fertilizers--A Tool in Conservation Farming." Allan B. Lemmon, Chief, State Bureau of Chemistry, Sacramento, outlined California laws which have to do with the activities of fertilizer salesmen. Dr. Albert Ulrich, Dept. of Plant Nutrition, University of California, Berkeley, spoke after dinner on 3 years' work on sugar beet plants in temperature controlled greenhouses. Rod Taft, American Potash and Chemical Corporation, Los Angeles, reviewed the unusual story of potash production in California and the United States, and exhibited a colored motion picture on the subject. F. Haven Leavitt, Shell Chemical Corporation, San Francisco, sketched the history and manufacture of anhydrous ammonia and ammonium sulphate, with an accompanying motion picture. Forrest Fullmer, American Potash Institute, Newport Beach, reported on nutrient levels found to exist in San Diego County lemon groves through leaf tissue analysis. George P. Bloxham, Pacific Guano Company, Los Angeles, pointed out the responsibilities of fertilizer salesmen to the industry and its customers and of industry management toward salesmen.

One of the oldest fertilizer companies in the Deep South is McMillan & Harrison, Mobile, Ala. For over 70 years, since 1880, this company has supplied fertilizer to farmers of Southern Alabama and Mississippi. The plant above was expanded in 1951, and now has a capacity of 10,000 tons of *Perfection Brand* and *Tenele* (the ten element fertilizer) annually.

S. K. Smith (left) is a partner and general manager of the McMillan & Harrison plant. Horace L. Long (right) is a partner.

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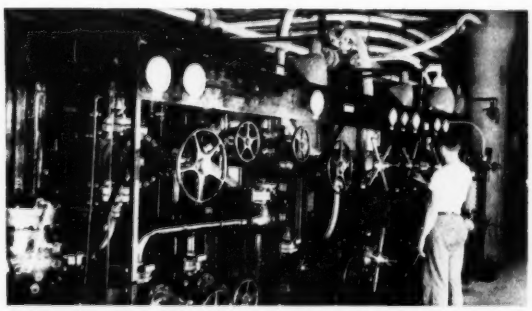

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Extracts from a talk by Dr. A. H. Moseman, Chief of the Bureau of Plant Industry, Soils, and Agricultural Engineering, before the Annual Conference of the Industry Research Committee of the Farm Equipment Institute, Lincoln, Nebraska—May 7, 1953.

The application of technology to the farms of America has made it possible for today's farmer to produce as much food, feed, fiber, and other agricultural products as 5 men could produce a century ago. There are more than 4 million tractors on American farms today as compared with around a thousand in 1910. We have seen the number of horses and mules decline from the peak of almost 27 million in 1918 to slightly more than 6 million today.

For the past 20 years agriculture has kept pace with industry in doubling the productivity of labor. In grain and oil crops the output per man hour is nearly 3 times as great today as it was in 1910. We have made remarkable progress just in the past decade. For example, in 1940 it took 47 man hours to produce 100 bushels of wheat. Today it takes only 31. Growing and harvesting 100 bushels of corn required 83 man hours at the beginning of World War II. Today the job can be done with 45. We are making gains in cotton production too. It takes only 143 man hours to grow a bale of cotton today as compared with 191 man hours in 1940.

Teamwork in Research

Those of us in Federal and State agricultural engineering research recognize that the contribution by the farm equipment industry to the Nation's productiveness has been tremendous. I believe it is fair to say, however, that the total impact of the technology that has transformed America's farms has been brought about by teamwork. It is the product of many scientists and engineers who have turned diverse specialties to a common problem. Sometimes they worked together right from the start. In other instances, one group may have made considerably more progress than the other. But the final fitting of a new technique to farm use and its widespread acceptance by farmers has come only when the new practice was perfected along many lines.

In the past 15 years we have watched the corn picker follow hybrids into fields across the country. The tempo has been stepped up since World War II and now corn on more than two out of three acres is harvested mechanically.

More recently the corn picker-sheller has come into the picture. Its increasing use also illustrates my point that research developments along many lines help gain acceptance by farmers of a new implement.

Engineering and Crop Production

The coordination of advances in agricultural engineering and progress in the breeding of improved plants has been essential and important. Engineers have designed machines to fit the crop. Plant breeders have fitted the crop to the machine.

Wheat breeders changed their blueprints for improved varieties with the wide acceptance of the combine-harvester. Farmers needed wheat with short, stiff straw and ability to hold grain without shattering. In the Pacific Northwest where combines were first widely used, today's leading commercial varieties are 6 to 10 inches shorter than the older varieties. The new hard red spring wheats and soft red winter wheats are several inches shorter than those they replaced.

Plant research has produced more than 60 improved dwarf varieties of grain sorghums that can be harvested by combine.

And look at the changes in soybeans. Over the past 30 years we have developed varieties of soybeans that stand erect for combine harvesting and do not lose their seed by shattering. This has increased the efficiency of soybean production significantly.

The plant breeders have changed shape of sugarbeets to facilitate mechancial harvesting and, as you know, commercial harvesters are now used on about 60 percent of the acreage.

In the peanut crop the agricultural engineers have recently modified grain combines to cut the labor of harvesting to about one-tenth of the time required by the conventional stacking method with the stationary picker. The new method takes from three to four hours to harvest an acre—the old from thirty to forty. But there's still a question in the minds of agronomists as to whether this is too costly in terms of quality loss. It appears that the biological problems are going to be more difficult to get around—in this crop—than the mechanical ones.

Not all of the work to develop plants for mechanization is done by the breeder. The change in cultural practices suggested by the agronomist, the plant physiologist, and the soil scientist are helping to make more effective use of the implements devised by the engineer.

Engineering and Soils

Now let's see how soils and engineering research are related.

The first engineers to work for the U. S. Department of Agriculture, in the 1890's, were concerned with soils and drainage. A few years later the engineers and soil scientists joined forces in attacking tillage problems. In 1942 the two research groups were more closely coordinat-

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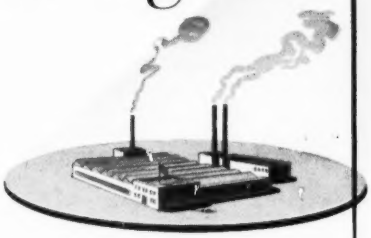
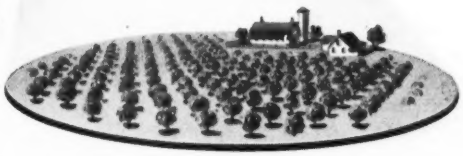
New Light





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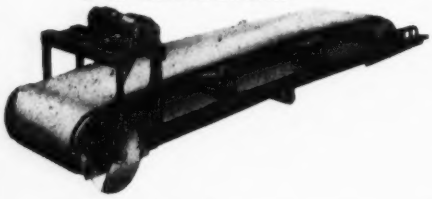
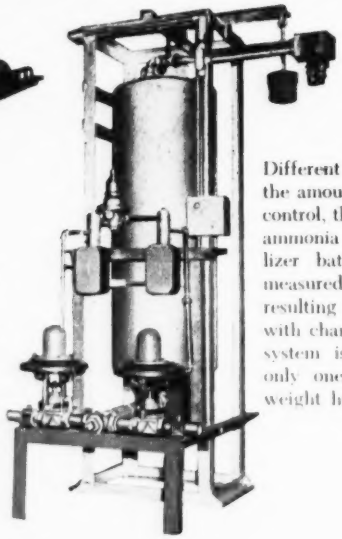


Custom made to individual requirements, D-K Conveyors are constructed with anti-friction bearings and quality components. Each device is specifically designed for a particular operation with flat surface of troughing belts either stationary or shuttle type. Characteristic D-K construction features easy maintenance and adjustment.



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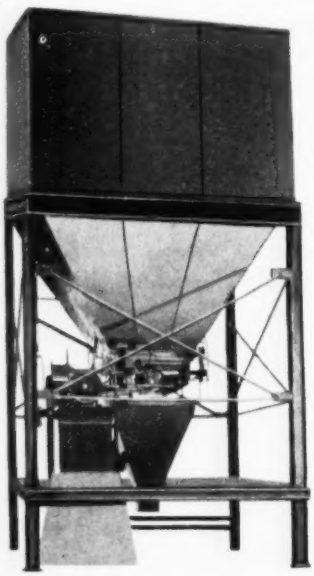
Different only in the materials used and in the amount of pressure they are designed to control, these tanks are for adding anhydrous ammonia or nitrogen solution to the fertilizer batch in the mixer. Solutions are measured by weight rather than by volume resulting in a more accurate measure even with changing temperature conditions. The system is entirely automatic and requires only one operator who also operates the weight hopper and mixing unit.



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ATLANTA, GA.

ed by a reorganization that placed them together in our Bureau.

As you may know, the Bureau has recently been given responsibility for some of the research formerly conducted by the Soil Conservation Service. The transfer, made this past November, involves projects dealing primarily with research on soil and crop management and the management of water on farms.

The new administration set-up makes it possible—for the first time since these studies were begun on a broad national scale—to tie them directly together at all levels with related research in crops, soils, and agricultural engineering. We believe that it will enhance the work all along the line.

The reorganization will be especially advantageous in tillage research. One development I'm sure will interest you. It has permitted us to place Dr. Mark L. Nichols in charge of the U. S. Tillage Laboratory at Auburn, Ala. As you know, Dr. Nichols was a leader in the establishment of the laboratory in 1935. Some of his basic studies on the relationship between soil type and condition and tillage equipment when he was professor of agricultural engineering at Alabama Polytechnic Institute showed the need for the laboratory. He has continued his interest in the work at Auburn during his years with the Soil Conservation Service.

I won't attempt to discuss all soils research in which Federal-State scientists have teamed to the farmer's advantage. But I would like to review briefly one study that is continuing to provide valuable information. I refer to the work on the placement of fertilizers.

Some of you may have had a hand in organizing the cooperative program in 1925. I suppose many of you have followed the reports of State and Federal agronomists on field trials to determine the value of different placement practices. Around a thousand trials have been run over the years. The engineers have built more than 40 machines to facilitate these tests. And as the benefits of proper fertilizer placement have been demonstrated, your industry has adapted the designs to farm use.

TRUE MORSE PLUGS FREE ENTERPRISE FARMING

Speaking at Gainesville, Georgia, where within a few short years a tremendous poultry industry has developed, True D. Morse, Undersecretary of Agriculture, stressed that no government subsidies or price supports had contributed to the achievement and said it was a "great demonstration of how agriculture can expand and thrive under freedom and lack of regimentation."

Fertilizer Build-up

The enormous build-up in the use of fertilizer currently envisioned has a number of implications for our joint program. It is now apparent that we must study the effectiveness of fertilizers on crops where it has not been profitable in the past.

We recently started a promising study along this line at Beltsville and other locations in the Southeast. It deals with pasture establishment. The reasearch is a follow-up of studies first conducted by the Ohio Agricultural Experiment Station.

Preliminary results from the first year's trials in the Southeast show that precision planting and fertilization produce better stands with far less seed than do the common practices.

Where soils give a high response to fertilizer, as they do at Beltsville, the results have been striking. The germination of seed has been high, both in the plots where the fertilizer was broadcast and in those where it was placed in rows. But the row placement gave more rapid growth. The seedlings were well established and survived the winter. In comparison the losses were high in the plots where the fertilizer was broadcast.

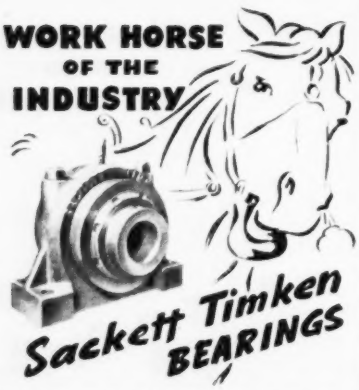
The difference in weed competition has been remarkable too. Where the fertilizer was broadcast, weeds benefited and flourished. Where it was placed in rows the crop seeds gained the full advantage and have become the dominant plants.

It's still too early to say whether fertilizer placement will have an important bearing on the establishment of pastures in many locations. But these preliminary findings show good possibilities for the Southeast.

In recent years many of us have become increasingly interested in soil-crop-residue relationships. This subject was very ably reviewed this afternoon by Drs. Duley, Russell, and McCalla, with others who have had experience with such practices. We all recognize the leadership taken by Drs. Duley and Russell in this work and their contributions here at the Nebraska Station. We are very glad indeed to have this able research team on the staff of the Bureau as a result of the transfer of responsibilities last fall from the Soil Conservation Service, and I am sure that their work will be continuingly effective.

We need further studies on the rate and placement of fertilizers in or under the surface residues, improvements in tillage and planting methods and equipment, and studies on weed, insect, and disease control methods. We are confident that through such research we can secure the benefits of crop residues and eliminate the unfavorable effect that they frequently have on yields.

Much of the objectionable soil compaction in row and grain crops is caused by frequent use of heavy farm equipment. Mechanization has brought its problems as well as its benefits. We must determine those soil conditions under which serious compaction is most likely to occur and find ways to overcome or minimize compaction troubles. The problems require increased attention on the part of soil and water con-



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servation research workers, agricultural engineers, and the farm equipment industry.

Problems of Mutual Interest

There are a number of problems of equal concern to farmers and to industry. One example that comes to mind is the effect of new pest control chemicals on application equipment. Two years ago the Sprayers and Dusters Association provided funds to initiate studies on corrosion of equipment. A member of our staff at the Pest and Plant Disease Control Machinery Laboratory in Toledo, Ohio, has been assembling this information from engineers, farmers, research workers, and representatives of chemical and farm machinery industries.

Although the survey is not complete, we know a number of the specific problems involved. We find that some of the most widely used new pesticides attack galvanized steel, soften rubber and some kinds of plastic hose, and cause pitting in zinc, aluminum, and other metals. Excessive wear is showing up in tanks, hose, and pumps of spraying equipment. Two recent trends add to the difficulties. These are the practice of spraying with highly concentrated wettable powders and the increased use of pesticide equipment for applying liquid fertilizers.

Fortunately we are finding some materials that are resistant to damage. These include certain special coatings and stainless steel. We are also obtaining data on the specific corrosive effects of chemicals used as active ingredients and diluents.

This problem is of concern to the manufacturers of equipment because of the deleterious effect of such a wide variety of chemicals on the machines you build. It is of importance to the farmer who buys your machines because he must be aware of the limitations of the equipment in handling certain chemical compounds. I believe it is reasonable to recognize that this is a job requiring participation and cooperation of public research agencies, working with the various industries that have a stake in this problem, along with the farmers.

Responsibility of the Engineer

The examples I have given of coordinated advancements in crop, soil, and engineering research illustrate the role of the engineer in most agricultural research fields. He is a full fledged member of the research team. This team can have no second stringers if it is to move ahead effectively.

The job ahead will require a similar type of coordinated effort on specific mechanization problems. In fact, it will call for even greater recognition of the needs of farmers for machines. In the past we have been concerned primarily with fitting machines to a crop, to a soil, or to a given job. More and more in the future we shall have to consider not only these factors, but also the question of designing a machine to fit the hands available to a farmer.

In 1910, when our national population was 92 million there were 12 million persons actively engaged in agriculture. By 1975 our national population is expected to be at least 190 million, and if the long-time trend continues, we may expect only about 9 million persons to be actively farming.

If the supply of farm labor is reduced, we must develop tools and machines that can be handled by the farmer alone, by his wife, or by his children. Operators of family-type farms already are turning away from crops that require additional hands during peak seasons. I have been told that this is a primary cause for the sizeable reduction in Michigan sugar beet acreage this year. Even though sugar beets have paid better than other crops, farmers just do not want to face the obstacles of competing for harvest labor in a tight labor market. Very likely, when one-man-operated harvesters become more readily available, Michigan farmers may grow more sugar beets again.

Last week in Pullman, Washington, I saw another example of the trend to fit machines to the farmer. The wheat grower in the Palouse region of the Northwest can no long-

(Continued on page 65)

Florida Goes Modern

To better serve its ever growing family of farmer-customers with plant foods of premium quality, the NACO FERTILIZER COMPANY selected the Sackett organization to design, construct and equip this new highly-mechanized fertilizer mixing plant at Fort Pierce, Florida.

This new facility is, to our knowledge, the first plant of its kind ever to be *custom-engineered* throughout to meet the complex manufacturing problems due to Florida's required multiplicity of grades.

Superphosphate and mixed goods producers are invited to get our seasoned counsel on their expansion and modernization programs. It is available at no cost.

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STORAGE OF PAPER BAGS

What follows here is Section 1 of a well-handled, well illustrated book on the proper handling of paper sacks, produced by the Paper Shipping Sack Manufacturers Association. The complete booklet is known as "General Manual #3" and copies may be obtained for 35¢ each by writing the association at 370 Lexington Avenue, New York.

Paper Shipping Sacks will give best service in packing and closing operations when the moisture content of the paper is between 6 to 7%.

To insure that empty paper shipping sacks retain their moisture, they should be stored in a fairly humid atmosphere. Good average conditions are 70° temperature and 50-60% relative humidity — higher humidities are sometimes beneficial.

Under these conditions paper shipping sacks contain about 6½% moisture and are flexible and strong. A "wet and dry" bulb thermometer set may be secured which does not record, but which gives accurate readings when a simple procedure for its use is followed. This is described in detail in United States Department of Commerce, Weather Bureau Bulletin No. 235, entitled "Psychrometric Tables," which can be secured from the Superintendent of Documents, Washington, D. C. at a cost of 30¢ (no stamps) with request.

As shipping sack paper loses moisture below 6% it tends to progressively become more brittle. Brittleness can be detected by the rattling dry paper sound made when sacks are shaken briskly by hand. In cases of brittleness, bales should be opened and the sacks spread out in a mechanically humidified room or on a covered loading platform in rainy weather for 24-48 hours to allow the sacks to absorb the moisture needed to regain their flexibility and strength.

Paper is sensitive to atmospheric conditions and will lose or gain moisture according to the moisture present in the surrounding air. Therefore empty sacks should never be stored in hot dry rooms nor near heating units nor under roofs where dry attic heat will absorb the moisture from the sacks.

Nor should empty sacks be stored at temperatures below freezing. In extreme cold weather, when the moisture in the air is frozen, empty sacks in storage under such conditions will be robbed of their necessary moisture content or may actually have their moisture content frozen or transformed into frost. Such sacks must be properly conditioned before packing.

Where weather conditions or limitations in buildings make it impossible to have natural moist warm storage, it is economical for users of paper shipping sacks to install humidifiers in their sack storage rooms.

The only really successful way to humidify a sack storage room is by using automatic humidifying equipment.

There are many kinds of equipment available, some using compressed air and water, some employing steam and others which use water sprays and fans.

A number of these units are low in price, while more elaborate units which include automatic controls are more expensive. Users should consult their sack suppliers for a list of manufacturers of storage room humidifying apparatus who should be consulted about proper construction of storage room walls and openings as well as installations of proper humidifying systems.

If the entire storage area cannot be properly humidified, it would be helpful to have an intermediate room between the main storage room and the packing room, large enough to hold a supply of sacks for a period of 24 to 48 hours at the recommended humidity and temperature before sacks are used. It is conceivable that sacks may be moved into such rooms on pallets or in bundles. All wrappings should be removed before attempts are made to condition the sacks.

If the user can build such a small room through which all sacks would pass for proper conditioning before filling, the arrangement will prove profitable. There are simply, inexpensive and very effective humidifying units which can be installed and which will provide ideal conditions.

If mechanically controlled humidity is not available, then temporary humidifiers may be installed. Some of these are listed below:

(a) Let steam escape in sack storage room to keep air and sacks humid. Keep a humidity indicator in the storage room and check it frequently.

(b) Store sacks on dunnage, away from the floor, and keep the floor wet so moisture can be absorbed by the air.

(c) Install a number of adequate sized water containers—barrels or large pails spaced at even intervals throughout the storage room. Suspend pieces of burlap 15 to 18 inches wide in the form of a wick, with one end of the wick in the barrel or pail containing water. A fan blowing on these will help considerably. Burlap strips may be 6, 8 or 10 feet in length, depending on the height at which the water containers are raised from the floor. Filled water pails should be hung from the walls or ceiling at equal distances around the storage room.

(d) Open windows on rainy days and allow damp air to circulate in the sack storage room.

(e) Another method is to drill needle holes in horizontal water pipes, and hang cloths over the holes. Air absorbs moisture from the wet cloths. Use a fan to help circulate the moisture.

(f) On some occasions it has also been found effective to operate an

(Continued on page 35)

MANAGEMENT IN 1953

The responsibility of business toward a business-minded government is the theme of this timely talk by Mr. Ford. At the time when associations find a surprising lassitude among their members; when our new Washington officials are genuinely disturbed because business has so much faith in them that it will not rally to support most points, Mr. Ford's discussion is worthy of careful reading.

A Speech by HENRY E. FORD Director Development Department
E. I. du Pont de Nemours & Company

The year 1953 presents an unusual opportunity to the managers of American business. As we look back over the history of this relatively new profession, the situation we see today is a challenge. Management at last has the chance to demonstrate that our system—individual initiative and competitive enterprise—can continue to provide better living for more people than any other system the world has devised.

I believe this demonstration will be successful only if we realize that it isn't enough just for management to operate a business at a profit. The times call for industrial statesmanship—for vision, courage, patience and wisdom, and the cultivation of understanding.

The American business pattern developed under a condition in which businesses were run, very largely, by the people who owned them.

All this has now changed with the expansion of our population and the necessary complexity of our industrial machine. Capital requirements today are such that one individual is unlikely to be able to furnish all the funds needed for a buisness of any size.

So today it is estimated that four out of every five persons is an employee, which includes management, a new and distinctive profession which fills the gap left by the disappearance of the owner-manager.

The managers of business have witnessed the rapid growth in popularity of a disturbing philosophy. The promise of getting something for nothing led many people to forget that we can have only what we produce. The time came when too many adults, and too few children, believed in Santa Claus.

It became fashionable to regard profits as sinful. From the highest realm of government came a command to perform the economic absurdity of raising wages without disturbing prices.

The few businessmen who ventured to protest against these practices were held up to scorn and ridicule.

Meanwhile something was happening all over the world. The communist imperialists of Russia grew bolder when the United States disarmed after the Second World War, and the world finally caught a clear glimpse of the miseries brought by totalitarianism. Word came back from Great Britain that socialism wasn't working out either.

Whether it was mistrust of socialism, a desire for a change, or only renewed proof of Lincoln's observation that you can't fool all of the people all of the time, we have had since January 20 a federal administration in Washington which is no longer hostle to American business. We even have businessmen in the cabinet.

The President's attitude toward business and industry was clearly and definitely expressed in his message on the State of the Union when he said:

"We are concerned with the encouragement of competitive enterprise and individual initiative precisely because we know them to be our nation's abiding sources of strength."

Price and wage controls have now been abolished. A real attempt is being made to reduce government spending—and for the first time in 20 years, the administration is cooperating with Congress to balance the budget. As soon as a balanced budget is in sight, we have assurance that taxes will be lowered, and of even greater importance, our tax system is to be revised so as to eliminate the penalties against incentive.

An attempt is being made to restore at least some of the state's rights which the federal government seized. We haven't had a crisis since the inaugural—not even a declaration of a national emergency.

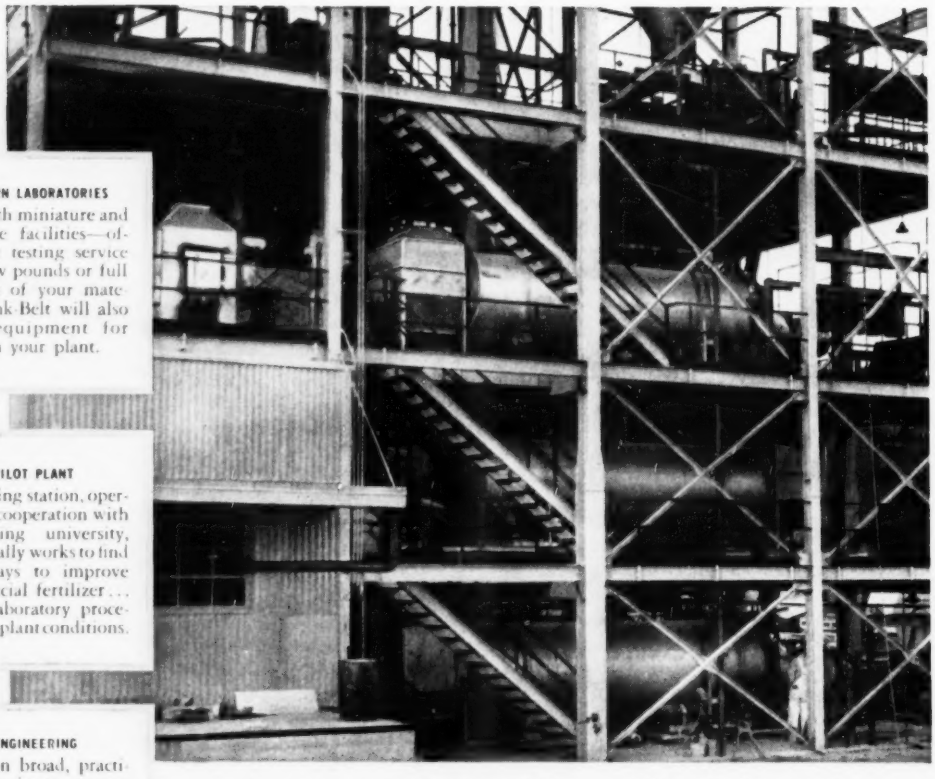
Now I think we should note carefully that the pre-election fears expressed by the critics of business have turned out to be wholly unjustified. We have no evidence of business "taking over" the government, or even wanting to do so. There have been no demands to "turn back the clock" and repeal such things as the Social Security laws. In fact, the only amendments to the Labor Management Act which Senator Taft seems willing to approve are those favored by union leaders.

Business management, in brief, neither asks, nor has received, nor expects to receive favors or special consideration from the government. All it desires is the chance to go forward, without unnecessary interference, to increase our productivity for the greater good of all.

Business will be content if we can restore a government of law rather than of men—a government

Before the Southeastern Conference of the Society for the Advancement of Management Asheville, North Carolina, May 7, 1953

Planning a fertilizer plant?



Ammonium nitrate plant, shown before completion of building, reveals variety of Link-Belt equipment used in conveying, drying, cooling, mixing, elevating and screening at large Southern chemical plant.

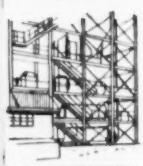
1 **MODERN LABORATORIES** have both miniature and full-scale facilities—offer free testing service on a few pounds or full carloads of your material. Link-Belt will also lease equipment for work in your plant.

2 **PILOT PLANT** and testing station, operated in cooperation with a leading university, continually works to find new ways to improve commercial fertilizer . . . adapt laboratory procedures to plant conditions.

3 **ENGINEERING** based on broad, practical experience, assures better equipment that often permits use of lower cost ingredients. Other developments have reduced processing time, saved storage space.

LINK-BELT offers a 6-point "turn-key" service --a unified responsibility for complete plants

4 **LINK-BELT EQUIPMENT** This includes dryers, coolers, granulating drums, disintegrators, continuous mixers, ammoniators, roll crushers, all types of conveyors and elevators, vibrating screens and a complete line of chains and power transmission machinery.



5 **SKILLED ERECTION CREWS** can be furnished by Link-Belt. Link-Belt experience includes dry-mix, superphosphate, nitrophosphate, ammonium nitrate, ammonium sulphate, urea, granulation and other plants.

6 **SATISFACTORY PERFORMANCE** When you rely on Link-Belt as a single source, Link-Belt accepts responsibility for placing your plant in full operating readiness. We will also supervise modernizing existing plants.

To find out how this unique "turn-key" service can serve you, get in touch with the Link-Belt office near you. Our engineers will work directly with you or your consultants . . . help you produce better fertilizer at lower cost.

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Many of the most effective fertilizers, in replenishing the soil and strengthening crop resistance to disease and drought, contain POTASH, often Sunshine State Potash from New Mexico. POTASH is a valuable profit-producing aid for farmer and businessman.

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where business operates under established rules, rather than be subjected to the whims and fancies of politically-minded individuals.

And here lies the opportunity of 1953 for American Business managers. It is the greatest in management history, but it also could be the last, for we should not deceive ourselves. The people have given us our chance, but we are still on probation. The silence of our critics is only partial and temporary. The alluring promises of yesterday will be trotted out again; our slightest mistakes will be magnified; the consumers will watch carefully the trend in living costs; the non-managerial employees of industry will keep a constant eye on our behavior.

Industrial statesmen must bear in mind the multiple responsibilities of management. It goes without saying that we must operate our businesses so that they will earn a return on capital investment. This is just as essential to the life of business as breathing is essential to human living. If we stop breathing, we die. A business dies when it becomes unprofitable.

But in the relatively brief existence of management, we have learned the formula for profit-making. We know we must offer goods or services that the people wants at a price which the public is willing to pay. We know that to do this and make a profit, we must strive constantly to improve our product or service. We must develop processes and tools which will cut costs and increase productivity. We can never be content with what we have.

Throughout the United States, business managers have been following the formula, but too many in the past seemed to feel that this was the extent of their responsibility. Business was business, and there the sun rose, and there the sun set. Only recently has there been growing realization that business can never be sealed off in a vacuum. It involves vital and delicate human relationships which, I regret to say, have been neglected.

To accept the opportunity, and to meet the challenge which confronts management in 1953, there are two other obligations which I venture to stress tonight.

The first is obvious in the light of past experience. The conduct of all segments of business henceforth must be such that it cannot be subjected to justified criticism. We know that one rotten apple can spoil a barrel. We know that the proponents of punitive and restrictive legislation at times conceded it wasn't justified for all business, but only because there was a fringe of wrongdoers. All business suffered, nevertheless. In the future let us make sure, by action and deed, that even the excuse is lacking for criticism and retaliation.

This still isn't enough. Management plainly has the obligation to take affirmative steps to scrape away the barnacles of misunderstanding. It must not only demonstrate; it must explain. It must shed light so that people will become aware of inherent values in our business system. The people are entitled not only to know what we are doing, but why we do it.

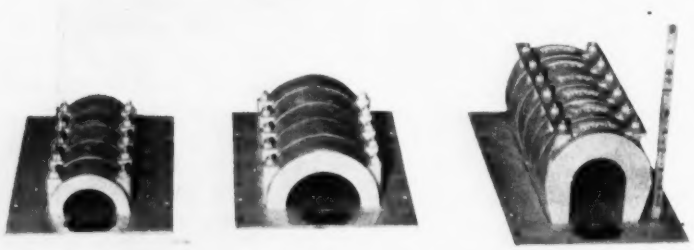
Now how can we create this understanding? How can we educate the man in the street to distinguish between what is sound, and what is unsound, what is good, and what is bad? How can we win the people away from the false economics taught and advocated in the last 20 years, and re-educate them in the fundamental values which have made this country great?

We could, I suppose, join together in some super organization of industry and try to find a spokesman whose words would command attention throughout the land. This would involve obvious difficulties, and it seems to me there is a better way, one that is more typically representative of the spirit of our Republic.

What could be more effective than a mutual effort, cooperative only in the sense that we all are participating, in which every management takes steps to spread understanding among its stockholders, its employees, and the people of the communities where it does business? This is the simple method, and because of its very simplicity, it is more likely to produce results.

Our political leaders have learned by experience that when the precincts are organized, the national election takes care of itself. I am confident that if business managements tell their story in the business precincts, where they have the respect and confidence of their own people, our system will have the understanding, sympathy and support of all the people of the United States.

That is the way we can rebuild good will between management and non-managerial employees. That is the way we can turn back socialism and communism. That is the way we can demonstrate that with invention and technology forever opening



These are some of the new, more powerful, re-designed line of low-cost non-electric permanent plate magnets with larger Alnico blocks which have increased magnetic strength as much as 50%. For taking out tramp iron, the new magnets are Mill Mutual approved for Class A and B installations, and magnetic strength is certified and guaranteed for the mechanical life of the unit. Write for bulletin to Dings Magnetic Separator, Milwaukee 46, Wisconsin.

up new vistas, we can never cross a last frontier, and we can never have a mature economy.

If all management will meet these obligations, and if the past indeed is prologue, the brilliance of American industrial achievement is only a dull sheen compared to the promise of the future. In the short period of half a century, we have substituted tools for manpower to obtain greater production so that the five-day, 40-hour week has taken the place of the six-day, 60-hour week common at the turn of the century.

We have witnessed the creation of air-conditioned trains, superhighways traveled by powerful automobiles, and dawn-to-dusk flights across continents and oceans in luxurious transport planes. We are able to wear fine fabrics fashioned from air, water and natural gas. Our wives have been emancipated from household drudgeries by the automatic washing machine, the vacuum cleaner, the electric refrigerator, and pre-processed foods.

These are not luxuries for a favored few. They have become necessities for the vast majority of our people, for under our system, all of the people share the benefits of the steady rise in the standard of living achieved by initiative and technology.

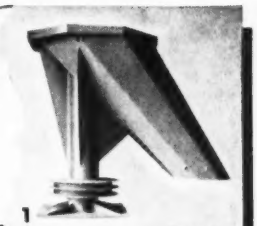
As we reflect upon these accomplishments in one short generation; as we recall that our grandparents, and most of us, never dreamed they would be realized; it seems futile even to try to imagine what the next half century will bring. But I firmly believe we **are** justified in the asumption that the year 2000 will find our grandchildren looking back to mid-century with pity—pity because of what they will regard as the harsh primitive life we lead today.

Let's make sure that they do. Our productive machine is the greatest in man's memory, but it is still in infancy. Our scientists and technologists can look back with pride, but they have barely knocked on the outer door of molecular and atomic understanding. If we do not miss our chance, a new and wonderful world awaits us.

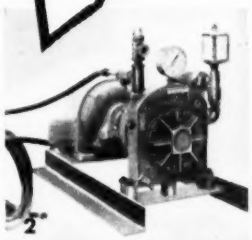
June, 1953

HAVE YOU OVERLOOKED ANY OF THESE IDEAS?

There are places in your fertilizer plants where low-cost Johnson accessories can profitably increase the efficiency of your bulk-material storage, batching and blending operations . . .

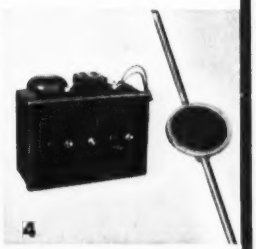


1 **Pivoted Distributor**
feeds materials to multiple-section bins. Turns, locks by ground-level control.

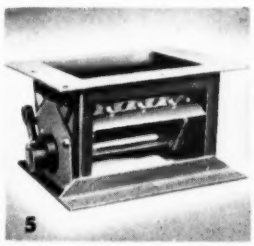


2 **Rotary Vane Compressor**
supplies 7 cu. ft. air pressure per min. to aerate silos, bins. 15-lb. limit-relief valve.

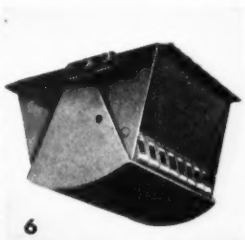
3 **Aeration Fittings**
properly spaced in storage bins and silos keep bulk materials fluid, free-flowing.



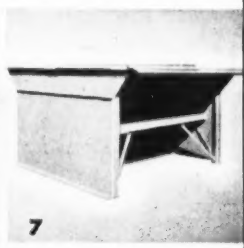
4 **Bin Gauges and Signals**
accurately register "hi-lo levels". Automatic. Water and dust-proof.



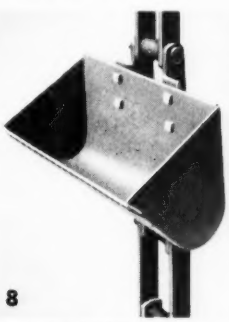
5 **Rotary Plug Valve**
controls flow of finest materials. Plug works freely in self-aligning bearings.



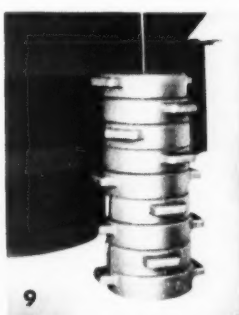
6 **Fill Valves**
single-clam, radial-type, have choker weights on closing edge for jam-proof closing.



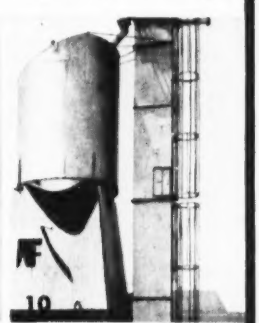
7 **Receiving Hoppers**
all sizes, types for box-car, hopper-bottom car, truck, or bag delivery. Weather-tight.



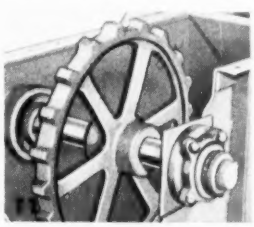
8 **Elevator Buckets**
all-welded, light, smooth. Two types, 7 sizes. Steel chain has carburized knuckles.



9 **Batcher Test Weights**
are available in sets of nine, 50 lb. calibrated units, and two 25 lb. steel hangers.



10 **Elevator Safety Cage**
28 in. diameter ladder safety cage, welded to casing, costs only a few dollars per foot.



11 **Chain Sprockets**
19-tooth chilled-rim cast iron with heavy split hub; 12-tooth cast-chrome manganese.

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1952 SAFETY AWARD TO COMMERCIAL FERTILIZER

The National Safety Council announced May 12 the recipients of its 1952 Public Interest Award.

The noncompetitive award is made annually to public information media for exceptional service to safety.

The 1952 award went to 16 daily and seven weekly newspapers, 79 radio and 16 television stations, four radio networks, eight general circulation and 21 specialized magazines, 19 advertisers, and 13 outdoor and transportation advertising companies.

Commercial Fertilizer received the following letter from the Council's president:

Congratulations!

It is a real pleasure for me to inform you that your organization has been voted the National Safety Council's Public Interest Award for 1952.

We here at the Council have been aware of all you have done for safety, and we are delighted that the judges agreed.

I am enclosing a copy of our news release announcing the awards so that you may have a complete list of recipients. As you know, the award is not competitive, but does give us an opportunity to express our appreciation for exceptional service to safety.

I am sure you feel, as we do, that there is another, less tangible result of your safety efforts—the knowledge that you have helped prevent many accidents.

Many thanks for your splendid support.

Sincerely,
Ned H. Dearborn
President

NHD:A
Enc.

"Be Careful . . . The Life You Save May Be Your Own"

NEW BLASTING METHOD TO SHOW AT CHICAGO

An unusual event will take place at 9:00 a.m., Thursday, October 22 at the plant of the International Minerals and Chemical Company in Chicago Heights as part of the Fertilizer Section safety meetings in connection with the National Safety Congress being held in Chicago on October 19-23.

Fertilizer operators have long sought for the safest possible method to be used in blasting fertilizer piles. The Cardox Corporation in Chicago has now come up with a plan which many feel may be the answer to increasing the safety factor in fertilizer plants by reducing the use of dynamite in fertilizer operations.

With the thought in mind of demonstrating to fertilizer plant owners and operators, superintendents, foremen and safety personnel, a demonstration of this new method has been arranged in Chicago at the time of the 1953 safety congress.

There are many who feel that this new system may be an indication of the trend in the fertilizer industry. The demonstration will provide the opportunity for fertilizer personnel to judge for themselves.

The following article describing this process has been prepared by G. M. Henry, Manager of the Lime and Steel Division of the Cardox Corporation at 307 North Michigan Avenue, Chicago 1, Illinois.

Safety

Cardox And Its Use In The Fertilizer Industry

By G. M. Henry

One of the foremost problems facing the production departments in the Fertilizer Industry is that of reclaiming the solidified mixed goods and super phosphates from curing and storage bins and compartments. This reclaiming procedure often creates hazards to safety, ties up man-power needed elsewhere, and imposes an undesirable load on mechanical equipment.

The Cardox System has been applied successfully as a solution to this problem during the past several years. Long familiar to the Mining Industry, Cardox utilizes the relatively slow, but powerful, heaving action of expanding carbon dioxide released from a steel tube. Carbon dioxide was the gas selected for Cardox because it is inert, will not burn or support combustion, and is non poisonous.

The Cardox tube is made of chrome-molybdenum steel capable of withstanding internal pressures up to 40,000 P.S.I. Into one end of the tube is threaded a charging cap and into the other end is threaded a discharge cap. The charging cap houses a charging valve and two electric terminals for connecting the firing cable to the heater element. When the current is applied to the terminals in the charging cap, the chemicals in the heater generate sufficient heat to instantly gasify the carbon dioxide, increasing the pressure within the tube.

The discharge cap is equipped with ports through which the expanding carbon dioxide is released. A soft steel shearing disc seals the carbon dioxide in the tube until the pre-determined pressure is reached. The disc then ruptures and the gas is released into the fertilizer pile.

Because of the variables encount-

Strong...

Strength and durability of papers and materials used in Hammond Multi-Walls, provide you with extra tough quality bags for safest, dryest packaging of your products. Correctly designed . . . produced by skilled craftsmen . . . in modern plants equipped with efficient production and material handling equipment . . . Hammond Multi-Walls will deliver your products "as packaged." Consult your Hammond man for Multi-Walls that meet every requirement of your products, and your delivery schedules.

For Multi-Wall bags, "make it a habit to depend on Hammond."

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Pasted Valve Type

Sewn Valve Type

Open Mouth Pasted Bottom

Open Mouth Sewn Bottom

10-10-10 fertilizer produced up to 132.4 bushels of corn in dry growing season

Farmers interested in big corn yields from run-down land can take a tip from Andrew Cross of Letart Falls, Ohio.

In 1952, he put an excellent 10-10-10 fertilizer program into effect on his newly-purchased farm. It included 600 pounds per acre of 10-10-10 plowed down, an additional 300 pounds at planting time and 50 pounds of nitrogen as side dressing. The result, in spite of rainfall four inches under normal, was yields up to 132.4 bushels per acre on relatively good land, and 89 to 111 bushels on land that had been left idle for 30 years as unprofitable.

This spring, Mr. Cross is applying 1000 pounds of 10-10-10 at plowing time and is looking forward to even better yields than in 1952.

Bigger yields for farmers mean better business for you

MR. CROSS embarked on his 10-10-10 program last year at the suggestion of a representative of a fertilizer manufacturer. His excellent results meant a good sale to him in 1953. You can build a profitable business in high-nitrogen fertilizers through just such an approach. It will pay off handsomely in years to come.

Be sure your high-nitrogen fertilizers are produced to give the finest performance, and that means U·S·S Ammonium Sulphate for the nitrogen content. This dry, free-running material mixes readily, won't set up in storage and behaves well in drills and other distributing equipment.

For complete information on U·S·S Ammonium Sulphate, contact our nearest Coal Chemical sales office or write directly to United States Steel Corporation, 525 William Penn Place, Pittsburgh 30, Pa.

U·S·S AMMONIUM SULPHATE

USS

UNITED STATES STEEL

ered, such as differences in manufacturing procedures, nitrogen content, type filler used, and method of filling the bins, each plant sets up its own shooting procedures. A typical dislodgment follows to a large degree this pattern.

1. The proper drill hole placement is selected and a 4'-6' deep hole is drilled into the pile. Vertical holes are not only practical but are very successful. However, the majority of drilling is done on a nearly horizontal plane with the drill being angled upward about 15 degrees. This method has the effect of cutting back the face of the pile and controlling overhangs.

2. A Cardox tube is inserted in the drill hole. Stemming may or may not be required depending on the physical characteristics of the material being loosened.

3. Electrical connections are made to the tube top terminals and the tube is discharged by means of a 3 volt dry cell, blasting magneto, or 110 volt current.

4. The escaping and expanding carbon dioxide breaks the fertilizer and tumbles it forward on to the loading floor.

5. The tube is recovered for recharging and further use.

Two factors determine the extent of the working face of Cardox—the volume of carbon dioxide and the release pressure. The release pressure determines the breaking force of the blow while the volume determines the radius of action of the expanding gas. It has been found that release pressure of 15,000 P.S.I. with volumes ranging from 80 to 130 cu. in. of carbon dioxide provide optimum results in mixed fertilizers and superphosphates. Once again physical characteristics of the material determine the proper volume.

When the proper pressure and volume have been found, these factors remain fixed and can only be changed by order of the Plant Management. Recharging of the Cardox tube is done in the users plant by means of a centrally located recharging equipment and the full tubes are supplied to the shooter with the correct quantity of carbon dioxide and thickness of shearing disc. Thus, the proper volume and pressure, which have been pre-determined, are guarded and variations in the shooting procedure are eliminated.

In addition to providing control of over hanging faces, the relatively low discharge pressures permit holes to be drilled and shot closer to bin walls and bulk heads without damage to those structures. Because Cardox continues to expand and does not reach its maximum volume until all its force has been spent, it is often found that part of the pile, which has not actually been dislodged, is expanded and softened to the extent that loading equipment can easily reclaim it without additional shots.

Noise and vibration, which are often factors to be reckoned with where a plant is located in a heavily populated or industrial area, are reduced to a minimum. Many discharges cannot be heard outside the immediate building. The system may be used with complete safety in the sometimes dusty atmosphere which exists in the fertilizer factory. The U. S. Bureau of Mines has approved Cardox as permissible for use under gassy and dusty conditions. The carbon dioxide is the same gas used in commercial fire extinguishers and, under emergency conditions, a Cardox tube itself may be used to extinguish oil, grease, gasoline, and electrical fires.

Safe, simple, and efficient, Cardox is providing an answer to the problem of how best to break down material for quick and easy reclaiming.

GORNTO WANTS CASE HISTORIES FOR CHICAGO SAFETY MEETING

Vernon S. Gornto, program chairman of the Fertilizer Section of the 1953 National Safety Congress, which meets October 19-24 in Chicago, wants case histories of accidents which have recently happened in fertilizer plants. Only six will be used during the Fertilizer Section meeting, but he wants 100 from which to choose. He asks that plants write him, giving the details of the accidents, the steps taken to investigate it, the cause, and what steps have been taken to prevent a recurrence.

Write these up and send them to Mr. Gornto, Smith-Douglass, Norfolk.

Bag Storage

(Continued from page 46)

electric fan back of an open container of water, or sometimes by dripping water in front of the fan.

(g) If sacks are wet due to leaky roof, etc., they should be allowed to dry out sufficiently before using.

(h) Stock pile rotation is a good policy. Fill oldest sacks in storage first, rather than newer supplies.

In some cases, sacks should not be filled immediately on delivery from the supplier because drafts through freight cars or other conditions during shipment may have lowered the moisture content of the sacks and they should be stored in a humid room for 24 to 48 hours before filling.

Any method of increasing relative humidity in storage rooms should be checked for effectiveness by the psychrometer, particularly during cold, dry weather.

Marietta Concrete Issues Silo Catalog

An informative 12-page catalog, showing their line of modern industrial storage silos has been published by Marietta Concrete Corporation, Marietta, Ohio, and a free copy will be sent to any fertilizer executive interested. The catalog shows how the precast concrete stave construction, which Marietta has been producing since 1916, reduces loss, waste, handling costs, insurance and fire hazards.

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superphosphate
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For complete information write:

MATHIESON CHEMICAL CORPORATION

Mathieson Agricultural Chemicals Division

Little Rock, Arkansas

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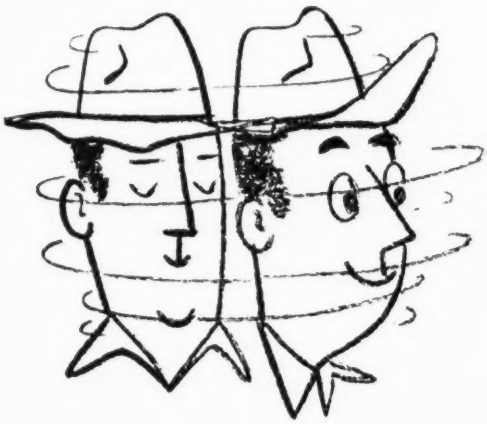
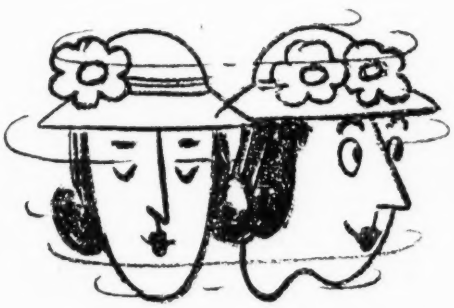


attract new fertilizer customers



with FULTON *TIME-TESTED* COTTON BAGS

You give your brand of fertilizer extra sales appeal when you use Fulton's attractive, high quality cotton bags — *which are designed for your customer's re-use.*

In new, and in old established markets Fulton's colorful FULPRINT and grey Sheeting Cotton Bags, have won new farm friends and kept old customers happy for many fertilizer manufacturers.

Get the benefit of Fulton's sales building Cotton Bags for YOUR brand of fertilizer this season. Call the Fulton Branch nearest you.

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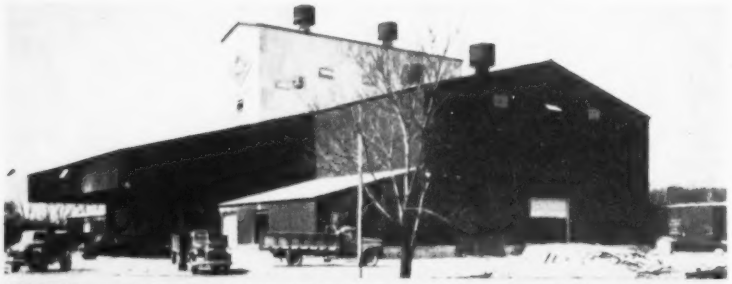
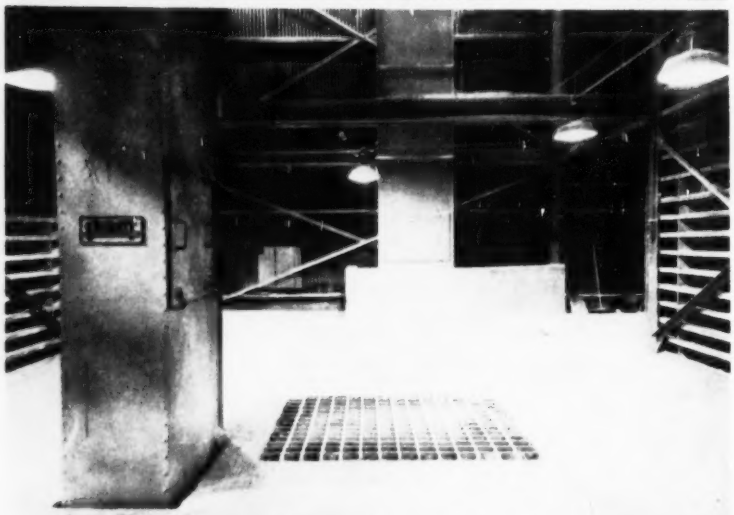
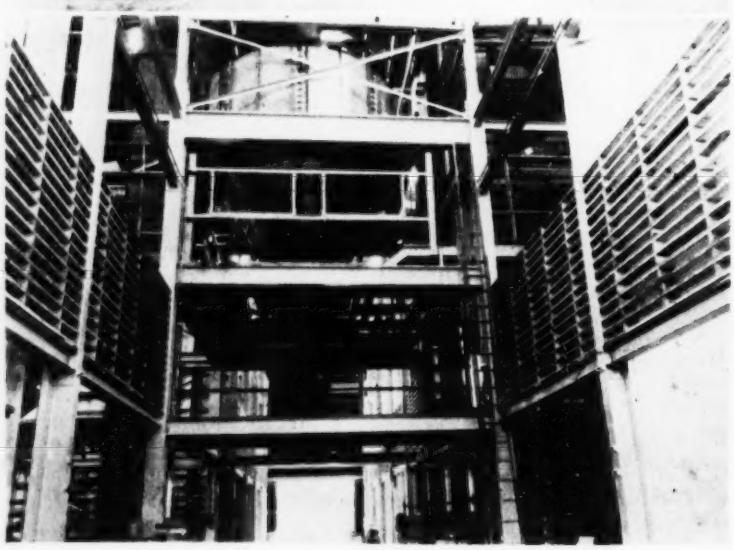
KINGSBURY OPENS NEW FERTILIZER PLANT







Modern New Facility Designed By Sackett of Baltimore

Kingsbury and Company of Indianapolis, one of the oldest-established mid-western fertilizer manufacturers, has recently opened their new thoroughly modern fertilizer mixing plant located at Peru, Indiana. This new plant, which replaced one destroyed by fire, was designed, constructed and equipped by The A. J. Sackett and Sons Company of Baltimore, Maryland.

Into this new facility has gone the wealth of experience and know-how which the Sackett Company has accumulated in serving our Industry exclusively for more than a half century.

The plant and its equipment was **custom-engineered** to meet exactly the production and shipping requirements of the Kingsbury Company. Its modern receiving and bulk distributing, recording type manufacturing, continuous ammoniating and shipping facilities make this one of the most highly-mechanized mixing plants now operating in the mid-west.

New Tennessee Fertilizer Plant

A. D. Adair and McCarty Bros. Inc. with plants at Atlanta, Georgia, and Chattanooga, Tenn., is building another at Gray Station, Tenn. The Gray Station plant is in the process of construction, but should start production the last of this calendar year. The officers are: A. D. Adair, Sr., President, A. D. Adair, Jr. Vice-Pres. & Sec-Treas. George H. Crossley, is superintendent at Gray Station plant.

Around the Map

COLORADO

National Farmers Union has not yet chosen a site for the $6,000,000 plant they contemplate. The Chamber of Commerce of Grand Junction has had its hopes blasted by a letter from general manager **C. E. Huff**, which indicates to them they will not get the nod. Montrose was also ruled out on the same grounds: Neither has the combination of low-cost power and plenty of sulphuric for which the Union is seeking. Know a site that does . . . and is in the area they serve.

DELAWARE

Valiant Fertilizer, Laurel, is operating its new $100,000 storage-processing-baggage annex. The main building is 84 by 128 feet, sixty high—and has 20 foot high storage bins. The loading platform adds 54 by 64 feet. If the city approves, an overhead conveyor will carry materials across the street, with a 15 foot clearance.

FLORIDA

Florida East Coast Fertilizer's Howard C. Bardsley has written a report on an acre of Alfalfa planted in the marl soil of Dade County. The USDA, dealers, farmers and F.E.C. Fertilizer joined hands in the experiment, which could be pretty important to the area.

* * *

Davison Chemical and the City Fathers are the subject of the most recent Lakeland Rumor. You may remember, from our April issue, that Swift & Co. were busy denying a Lakeland Rumor about a $25,000,000 plant. This is on a more modest scale. It concerns some city land with hogs above-ground and phosphate rock below, a couple of holes of the local golf course which are on the wrong side of a highway, anyhow—hence a menace to navigation—and which the city could move back to rejoin the other 16 holes if Davison gave them some land in exchange for the hog-farm acreage . . . etc. etc. The City Manager says nothing has been done. Davison have said nothing, and may be totally surprised when they see this so far as we know.

GEORGIA

Hulme Fertilizer, Athens, lost a block-long warehouse the end of April to a fire which threw a heavy cloud of smoke over the downtown area. **H. G. Hulme** heads the concern.

* * *

Central of Georgia R. R. officially opened its new million dollar warehouse at Savannah May 12, with the landing of a 11,000 ton cargo of nitrate of soda from the good ship Dorion. The warehouse has a 50,000 ton capacity and replaces one on the same site destroyed last year by fire. Bagging facilities are included.

LOUISIANA

General Chemical (Allied Chemical & Dye division) sulphuric plant at Baton Rouge will be completed by the end of the year, according to latest reports.

* * *

Commercial Solvents expect to complete in time for the coming fertilizer year "the first post-war plant built to help meet the world-wide nitrogen shortage." This plant, which is part of the plant at Sterlington, which has been reported here as it progressed, will double the company's present output of nitrogen for agricultural and industrial use. The plant will also add two new basic sources of nitrogen—Dixsol solutions and crystalline ammonium nitrate.

The picture shown here is published in the interest of "science". Alex Oliphant, Victor Fertilizer Co., Chester, S. C., was successful in obtaining a special watermelon seed from Jamacia from which this giant watermelon was grown. Through the use of plenty of water and some of Victor's famous fertilizer, this fine specimen was produced. Address all inquiries to Alex Oliphant, Victor Fertilizer Co., Chester, S. C.

MADE AS CAREFULLY AS YOUR BEST TAILORED SUIT

Top-grade bagging materials plus expert designing and careful construction, give V-C Multiwall Bags the ability to stand rough, tough treatment in handling, in shipping and in storage.

Better-built V-C Multiwall Bags are made and attractively printed to your specifications in the following styles: sewn open mouth, sewn valve, sewn valve with sleeve or with tuck-in sleeve, pasted open mouth, and pasted valve.

Write for full information, or discuss your bag requirements with a V-C representative. Get the facts now on V-C's speedy deliveries and expert technical assistance.

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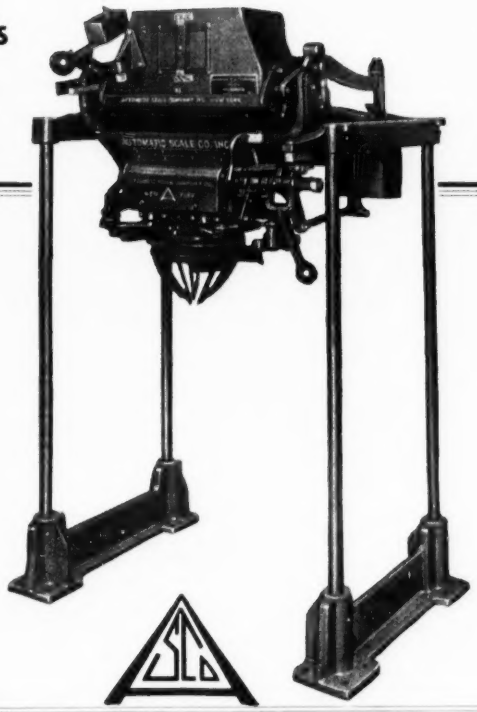
OTHER V-C PRODUCTS: Phosphate Rock Products • Complete Fertilizers • Chemicals • Cleansers • Textile Fibers • Pest Control Products

Here's How



1 Man with a 515-B Sacking Scale Can Handle *any Kind of Sack* — **Paper • Burlap • Cotton**

The man clamps the bag—the scale does the rest. No gates to close—nothing to watch. 25 to 35 tons per hour. Accurate enough to satisfy the most exacting. Clamp handles paper, burlap, and cotton sacks. Automatically adjusts itself to any thickness or size of bag from 36" to 60" cut circumference.

AUTOMATIC SCALE CO., INC.
591 HUDSON ST. NEW YORK, N. Y.

MASSACHUSETTS

Merrimac Division (Monsanto) is making a 50% increase in its sodium bisulfite capacity, according to production manager, **J. A. Wilson**, in order to supply the growing demand for a silage preservation. Distributors already named by Merrimac general sales manager, **H. J. Heffernan**, include **Louis E. Page, Inc.**, Concord; **G.L.F.** of Buffalo, N. Y.; **P. J. Oesterling & Sons, Inc.**, of Butler, Pa.; **Pennsylvania Farm Bureau** of Harrisburg, Pa., and **Hopkins Agricultural Chemical Co.**, of Madison, Wis.

Monsanto's action follows closely the report by **Pennsylvania State College** that sodium bisulfite results in "very satisfactory silages," Mr. Wilson said. Experiment on sodium bisulfite supplied by Monsanto were conducted by **Drs. R. W. Swift, John W. Bratzler** and **R. L. Cowan** of the School's Animal Nutrition Department.

MISSOURI

Monsanto's Organic Chemicals Division is using 10-inch 78 RPM phonograph records to prospects. On one side is the "ONB Samba" and on the other the "Monsanto March."

NEBRASKA

Falls City Fertilizer, Falls City, which reported in March as expecting to be in production by mid-May are not expecting to be underway by mid-June. They have leased the roundhouse of the Missouri Pacific Railroad for use as a fertilizer plant. **Howard L. Peterson** is president; **Louis Willis** is plant foreman. The concern is aiming at 10,000 tons annually.

OHIO

Stadler Fertilizer, Cleveland, about to celebrate its 100th anniversary, plans as part of that celebration the completion by 1954 of a $100,000 plant expansion. **John F. Johnson** has been moved to board chairman, while **Wesley W. Johnson** moves into the presidency, is treasurer and general manager as well. **Otto C. Herbst**, former secretary and treasurer, was named vice president and secretary. **Verne E. Winans**, sales manager, is now vice president in charge of all sales activities.

PENNSYLVANIA

Neighbor Trouble has afflicted two Pennsylvania concerns: **American Cyanamid**, despite previous state approval, has had civic groups barking about building an "explosives storage dump near a public school" . . . **U. S. Gypsum** has been troubled by residents who objected to their building an unloading dock on the Schuylkill River.

SOUTH DAKOTA

Summers Fertilizer Co., Baltimore, Md. are planning a mixing plant at Sioux Falls, according to **W. A. Stolt**, division manager. 25,000 annual tons is the production expected.

TEXAS

Dow Chemical tired of closing down because hurricanes are threatened, and now is keeping track of them with radar equipment with a 300-mile range at Freeport. Now when warnings are broadcast the plant stays in production until the radar says the winds are really coming their way. They used to lose a lot of production time—but now the plant people don't shut down until ten hours or so before the storm, and all are on their way home several hours before the storm center arrives. It pays.

* * *

Neighbor Trouble has afflicted concerns in Texas, too. The old fume trouble has hit Beaumont, and **Magnolia Petroleum, Texas Gulf Sulphur and Mathieson Chemical.**

AUSTRALIA

Sulphide Corp. Pty. Ltd. Newcastle, New South Wales, are starting a million pound sulphuric acid plant which is slated to be in production by the end of next year, turning out 100 daily tons.

CANADA

Hamilton, Ontario, is considering a plant to produce organic fertilizer from the city's sewage. **G. T. G. Scott** of **Canadian-British Engineering Consultants** has been called in to discuss with the Works Committee similar plant developments in England.

MEXICO

Gulf Sulphur have just released a geological report indicating sulin 64.3 of their 700-acre tract in Vera Cruz. Additional exploration continues. Meanwhile, president **R. H. Van Doreen** announces the engagement of **Blaw-Knox** to make an engineering survey for erection of a Frasch process plant there.

TURKEY

Gubre Fagrikalari Turk Anonin Ortakligi, Istanbul, has been formed, with the **Fertilizer Corp. of America** participating with Turkish financiers and supplying four of the seven Board members.

CORRECTION

"We note with interest your comment in the May Issue of Commercial Fertilizer pertaining to our San Jacinto operation. It is referred to geographically as being located in California but for your information, the plant is located at San Jacinto, Texas, about fifteen miles east of Houston."

SMITH DOUGLASS CO., INC.
J. H. Culpepper, Vice President

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FURFURAL RESIDUE

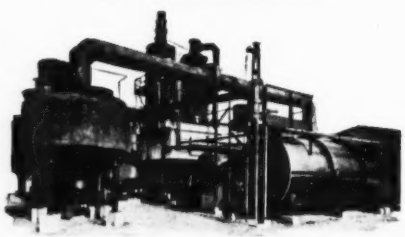
The STERILIZED . . . . . Organic Conditioner

Heated to 350° F for several hours in the presence of steam and small amounts of acid, FUR-AG is freed from plant diseases, insects, seeds, and other similar contaminants. This is an important consideration in the selection of FUR-AG as the conditioner for your fertilizer.

In addition, FUR-AG has the properties you expect in a good conditioner. It speeds up curing in the pile, helps prevent mixed goods from caking and provides bulk. Best of all, FUR-AG is produced and available in volume the year around. More complete information on request.

The Quaker Oats Company
CHEMICALS DEPARTMENT
345 The Merchandise Mart
Chicago 54, Illinois

CHEMICO PLANTS
are profitable investments



Chemico's services cover every detail in design and construction of sulfuric acid plants, acid concentrators, complete fertilizer plants and P-A Venturi Scrubbers for fluorine fume elimination. Chemico's performance guarantees are backed up by 38 years of experience. Consultation involves no obligation.

CHEMICAL CONSTRUCTION CORPORATION
488 Madison Ave., New York 22, N. Y.

MARKETS

ORGANICS: Active sales have been made recently of Blue Lupine Meal offered by the Commodity Credit Corporation at $21.00 per ton, bagged, or $19.00 per ton bulk, f.o.b. Georgia South Carolina production points. This material tests approximately 6% Ammonia. Heavy sales have been made for shipment during 1953. Domestic Nitrogenous Tankage continues at prices varying from $4.50 to $5.00 per unit of Ammonia, bulk, f.o.b. shipping point. Imported Nitrogenous is indicated at around $5.35 to $5.50 per unit of Ammonia, in bags, CIF Atlantic ports.

CASTOR POMACE: Domestic producers continue to offer at $37.25 per ton in burlap bags paper bags, seller's option, f.o.b. Northeastern production points with $2.00 per ton allowance if shipment is made in paper bags. Imported material, depending on quality, is indicated at around $36.00 to $42.00 per ton ex-vessel Atlantic ports.

DRIED BLOOD: Unground Dried Blood in the Chicago area is $4.75 to $5.00 per unit of Ammonia bulk and New York market is quiet at around $5.00.

POTASH: Movement of Muriate of Potash from Domestic producers during March and April was quite heavy and shipments continue good. Contracts are being made for the new season at 43c basis f.o.b. Carlsbad, in bulk, less usual 16% season discount. Limited supplies of Imported Potash are available at a few Atlantic ports at prices under the price of Domestic material at these ports.

GROUND COTTON BUR ASH: This source of Potash, primarily in the form of Carbonate of Potash, continues available for prompt and future shipment at prices approximating the cost of Domestic Sulphate of Potash delivered destinations.

PHOSPHATE ROCK: Shipments recently have been primarily against domestic and export contracts. Supply position is relatively tight and market firm.

SUPERPHOSPHATE: Prices continue firm with very definite prospect that, effective June 1st, on account of increased cost of Sulphur, price of Normal Superphosphate will be raised by most producers. Triple Superphosphate continues short of demand and the market tight.

SULPHATE OF AMMONIA: March and April shipments of coke-oven production were exceedingly heavy but demand is tapering off at the moment. Fair stocks of Imported material are available at Atlantic ports at a price of $47.00 per ton, bulk, f.o.b. cars.

AMMONIUM NITRATE: Prices continue firm and unchanged with demand for in excess of supply.

NITRATE OF SODA: Demand is in seasonal dimensions with adequate stocks of imported material at the ports. A limited supply of reclaimed Chilean Nitrate of Soda, resulting from a fire at Wilmington in March, continues to sell at bargain prices, both in bulk and in bags.

CALCIUM AMMONIUM NITRATE: Limited supplies at several ports on the Atlantic and the Gulf are available at $51.25 per ton, in bags, f.o.b. cars at ports as Mobile, New Orleans, Savannah, Charleston and Wilmington.

GENERAL: Most fertilizer ingredients appear to be in comfortable supply with the exception of Nitrogen Solutions and 33% Ammonium Nitrate.

Enlarged Facilities For Southern Lead Burning

New shop facilities in Atlanta now enable Southern Lead Burning Company to serve their customers by shop fabricating lead equipment that usually has been done in the customer's plant. The company now furnishes lead and lead lined tanks, acid coolers, lead flues, etc., for acid plants, as well as lead equipment for the chemical industry in general.

The company specializes in sulphuric acid plant construction, principally Mills Packard water cooler type; building complete new plants or modernization of old box chamber plants by adding Mills Packard chambers to old box chambers.

Several of the larger acid plants in the South have been completely converted from box to Mills Packard, in some cases building a new plant, in others, building new chambers and using parts of the plant such as the Tower, coolers tanks and burners.

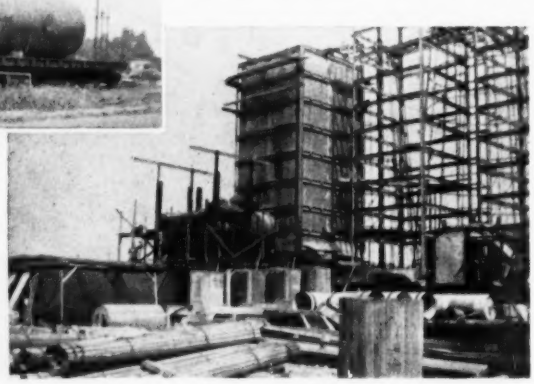
The company claims that with possibly one exception they have constructed more Mills Packard chambers than any other company in the United States in the last 8 years. Two chambers now under construction brings their total to 26 chambers as well as numerous Towers and auxiliary equipment.

Monsanto Brochure On Water Soluble Fertilizers

Facts and figures which fertilizer manufacturers, either present or prospective, will find valuable as an aid in formulating, packaging, and merchandising water soluble fertilizers are contained in a booklet just published by Monsanto Chemical Company's Phosphate Division.

The market for such fertilizer products is described together with the underlying reasons for growth of the industry anticipated in the near future. Advantages of the use of water soluble fertilizers are described, both from the manufacturers point of view as well as from that of the user.

Briefs of the various state regulations or laws on labeling, taxes or fees, and other pertinent points applicable to fertilizer manufacturers also are reprinted. Further information or copies of the booklet may be obtained from Phosphate Division, Monsanto Chemical Company, St. Louis 4, Missouri.



. . . Lead Lined Equipment or Construction of Complete Acid Plants

SOUTHERN LEAD BURNING COMPANY

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Specializing

SULPHURIC ACID

Ground Cotton Bur Ash, 38/42% K_2O Potash.

Nitrogenous Materials

Castor Pomace

Phosphate Rock

"Riceland" Ground Rice Hulls

Representatives

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Bags—Paper and Textile

Ammoniated Base and Superphosphate

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(42-44% Magnesium Carbonate)

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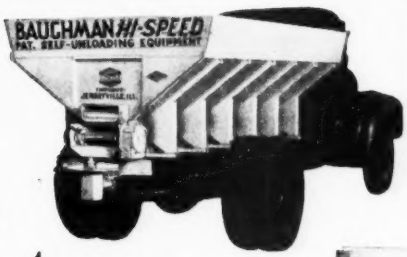
Hi-Speed job-fitted

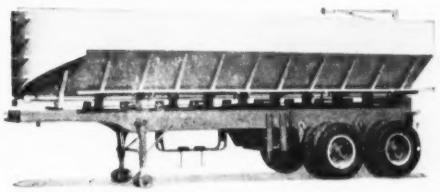
BAUGHMAN MATERIAL HANDLING EQUIPMENT

Model 235 Fertilizer Spreader Attachment. Holds spread close to ground in 20-30 ft. path. Folds on heavy hinges to 8-ft. for highway travel.



Model ASK-3-6 Spreader Body. Completely self-unloading. Fingertip controls in truck cab. Three-speed transmission (optional) for thin-to-heavy applications.

This phosphate plant installation includes: (1) **Model 175 Belt & Bucket Conveyor** which feeds (2) **Model Q-51 Stationary Screw Conveyor.** Also included are **Undertrack Conveyor Model UT-51** and **Underbin Conveyor.**



Model K8-T-B. Self-Unloading Transport for Super Phosphate. Completely automatic 16" belt conveyor, full length of body, overcomes phosphate packing. Discharges onto ground or conveyor. Lengths: 15'-33'.

WRITE for complete literature on any of above items.

BAUGHMAN

BAUGHMAN MANUFACTURING CO., Inc.
140 Shipman Road • Jerseyville, Ill.

Moseman

(Continued from page 44)

er afford to hire one man to drive his tractor, a second man to operate the combine, and a third man to drive the truck to haul the grain from his field. The labor supply no longer permits this.

At a small welding shop on the outskirts of Pullman I saw a machine the builder called "the iron monster," It was a pull-type combine that had been remodeled into a self-propelled, self-leveling machine with a 4-wheel drive and with several special features designed to facilitate one man operation. There was a pick-up type of reel for handling lodged grain. The cylinder speed could be adjusted from the driver's seat. There was a chopper device to cut up the straw before it was scattered back on the land, to reduce the crop residue and trash problem for the follow-up job of plowing. The leveling mechanisms enables the combine to remain level, for most efficient threshing and cleaning, while the cutter bar moves ahead horizontal to the dipping, climbing, sloping contours of the Palouse hills. It needs further refinement. It is already claiming the attention of the plant breeder. He has taken steps to breed a tough rachis or seed spike resistant to shattering into his wheats. He told me he would have to be more conscious than ever of selection for ease of threshing in breeding new varieties for the Pacific Northwest.

The job of developing machines better suited to the needs of the farmers will require cooperation not only between scientists within public research agencies, but also between public and private research organizations and the manufacturers of farm equipment. I believe the Committee of the American Society of Agricultural Engineers that is serving as an advisory body to our Division of Farm Machinery, provides an excellent mechanism for maintaining this type of contact. We shall certainly look forward to a continuation of our working relationship with that Committee.

One of the questions I have not answered is the role that private industry might play in future agricultural engineering research. I believe the Secretary of Agriculture provided us with an excellent guide in his recent address at Purdue University.

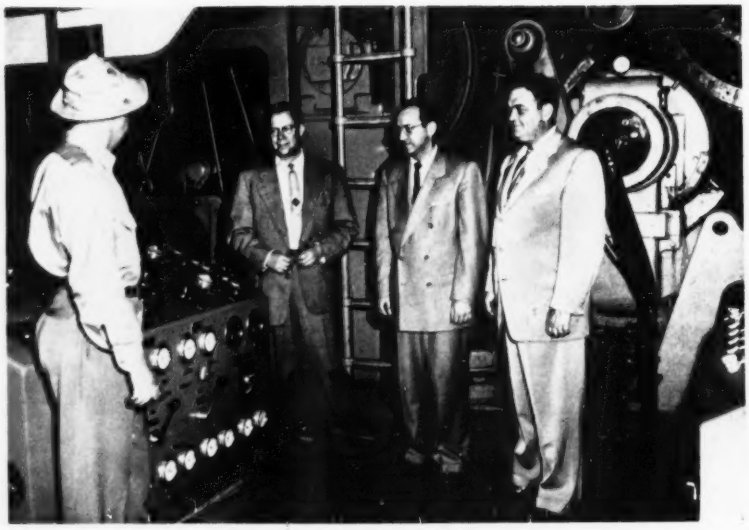
Mr. Benson said, "One of the aims of the present administration, and one which I should do everything in my power to bring to fruition, is to create in this country a climate that will make it worth while for private citizens and business men to use their initiative to solve their own problems and reap their own rewards. This applies to research, as to all other activities. I should like to see more industries shoulder their responsibilities by engaging in aggressive programs of research."

Mente Acquired By Three Bag Men

Three men, associated with other bag concerns have acquired Mente & Co. New Orleans textile bag manufacturer. They are T. J. Semmes, president Semmes Bag Co., Memphis; M. A. Greenberg, president Republic Bag Co., St. Louis; H. Reichert, American Bag Co., Minneapolis.

Clever Guide To Reduction

Gruendler Crusher & Pulverizer Co., have published a clever guide to the use of reduction equipment. Giving each of their units an index number, they have charted the equipment needed to carry various materials through various stages of reduction. 180 materials are listed. For copies of this handy folder, write the company at 2915 N. Market St., St. Louis 6.



(Left to right) L. M. Boinest, superintendent, S. D. Fleet, Vice President and sales manager, J. R. Clements, mid-west sales manager, Multi-Wall Bag Division and Jeff Johnson, representative, Multi-wall Bag Division of the Albemarle Paper Manufacturing Company. Picture was taken recently at the control panel of Albemarle's new paper making machine at the company's Roanoke Rapids, North Carolina, plant. This new machine, which greatly increases Albemarle's Multi-Wall Bag capacity, is capable of producing 225 tons of kraft paper per day.

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ORANGEBURG, SOUTH CAROLINA

Personals . . .

William C. Lovejoy, credit manager of **Fulton Bag & Cotton,** and with the company for 33 years, retired May 10. Looking back over 56 years in the credit field, Mr. Lovejoy comments on the fact that credit men are no longer bookkeepers, but men of highly specialized training in an important profession. His comment on retiring "I feel like I'm leaving home."

Fulton Bag & Cotton Mills in Dallas announce the appointment of **James A. Spaulding** to their sales staff effective immediately. Mr. Spaulding will represent the Company throughout the central southern section of Texas with headquarters in Austin.

* * *

Harold J. Kreher has become manager of sales, pig iron and coal chemical division, for **Inland Steel,** and now has as his assistant manager Roger S. Bullard.

* * *

Arthur L. Ross has been made a vice president of **International Paper.** A veteran of 28 years with International, he has been assistant general manager of the Southern Kraft division since last August, which post he will continue to hold. The division employs more than 14,000 and produced last year more than 2,400,000 tons of kraft paper, board and dissolving pulp in its nine mills.

Floyd Prather, president of **Central Texas Fertilizer,** Comanche, Texas, has been made head of the board of trustees of the Comanche Independent School District.

* * *

Horace M. Albright, president of **U. S. Potash** is also president of Resources for the Future, Inc. This group is sponsor of a conference on conservation and utilization of natural resources. He announced the appointment as a chairman of **Lewis Williams Douglas,** formerly vice-president of **American Cyanamid,** former ambassador to the United Kingdom and now Board Chairman of Mutual Life Insurance Co. The conference, scheduled for December in Washington, and is entitled "Mid-Century Conferences on Resources."

* * *

Thomas Mills, a member of **Virginia-Carolina's** engineering department, and **F. L. Early,** ex-V-C because he is now Second Lieutenant Early, distinguished themselves recently when two Richmond men were swept over a dam. Mills rescued one; Early the other—both diving into the river to make the rescues.

* * *

B. J. O'Hearn, Southwestern district manager, and **W. H. Burget,** representative will handle the multiwall bag sales for **Union Bag & Paper** out of the new Western sales office in the Victor Building, 6 West Tenth Street, Kansas City, Mo.

R. W. Breidenbach, who has been named assistant to the general manager, agricultural chemicals division, Commercial Solvents. He will direct development of distribution for the nitrogen from the new plant at Sterlington, La., (See Map)

* * *

J. A. Woods, Commercial Solvents president, had a letter in a recent issue of Look Magazine, praising an article on Blood Substitutes.

* * *

Abbott K. Hamilton, Vice President of Product Divisions, and **Sydney T. Ellis,** Administrative Vice President, have been elected to the Commercial Solvents Board of Directors Mr. Woods has announced.

* * *

James B. Kelly has been appointed Vice President of the **McCloskey Company** of Pittsburgh, it was announced by President Robert F. McCloskey, Jr.

CAL-MAG OXIDES
CUT YOUR COSTS WITH

Unexcelled for its superior Dehydrating, Neutralizing, and Curing factors in the preparation of better fertilizers. Write for complete information.

PROMPT SHIPMENTS
Three railroads serve our Carey, Ohio plant--assuring prompt delivery--everywhere.

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CaO 58.07
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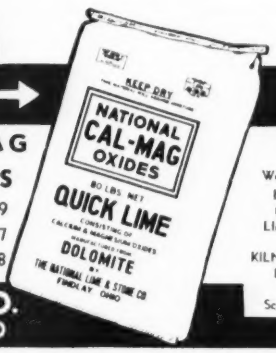

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Screened to size

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In the field of PESTICIDES

NAC EXPLORES EXPORT MARKET

Lea Hitchner, executive secretary of the National Agricultural Chemicals association, has explained the set-up of the new foreign trade committee, headed by Norman E. Horton of Monsanto. It has several definite jobs to do: Domestic—to keep an eye on standards of quality and packaging and to watch matters relating to shipping, government rules and procedures of importance to exporting members. Foreign—to work with the Government to help build up and properly serve foreign markets. Generally to help extend to the foreign trade the program NAC maintains for its members.

The importance of this move should be apparent to our readers who are aware that various conditions have brought about an oversupply of many pesticide ingredients. And while the export volume was climbing, 1952 showed a drop from 1951, and early 1953 figures are running below 1952.

USDA RESEARCH DEVELOPING IMPROVED INSECTICIDAL DUST

Improved insecticidal dusts are being developed by mixing organic insecticides with chemically-treated calcium. Entomologists of the U. S. Department of Agriculture report that these new mixtures have good dusting qualities, giving a free-flowing dust cloud and good coverage of plants in field tests with both airplanes and ground equipment. Laboratory tests indicate the dusts store well, even under extremely moist conditions.

Although calcium carbonate has been considered by some to be incompatible with most organic insecticides because of its alkaline content, mixtures of this mineral with the insecticides DDT, EPN, gamma BHC, heptachlor, parathion, and toxaphene were still effective after storage for a year or longer in tests conducted cooperatively by agricultural experiment stations in Texas and Mississippi and USDA's Bureau of Entomology and Plant Quarantine. The entomologists, testing the mixture at intervals, found that none of the insecticides broke down or lost their effectiveness when stored in tightly stoppered glass bottles at room temperatures. All except gamma BHC retained effectiveness when placed in paper bags and stored at 100 percent relative humidity.

Several tons of toxaphene-calcium carbonate dust and a dust containing gamma BHC,, DDT and calcium carbonate, used in field tests after six to eight months' warehouse storage, gave good control of the boll weevil and bollworm. Boll weevil populations to two cotton fields where the experimental dusts were used decreased in 14 days from 60 percent infestation in each field to 25 percent and 28.5 percent infestations. In both ground machine and airplane dustings, the mixtures flowed well and there was even distribution of the insecticide. There was no caking or bridging of dust in any of the equipment.

Doane Reports Test Of Chemical Soil Conditioners

On May 22, 1952 the Doane Agricultural Service, Inc., and the Agricultural Institute of St. Louis undertook a study to evaluate the comparative performance of commercial soil conditioners. A conference was held with Battelle Memorial Institute, Columbus, Ohio on May 26, 1952 outlining the steps which should be taken for establishing such a study.

A plot of land in the Florissant Valley near St. Louis was selected on which to conduct these tests. The soil was a silty clay loam showing a little more than 20% clay size. The land had a crop of red clover grown in on it which was harvested, and following harvesting the area was plowed and double disked. The area was then surveyed and staked for application of 16 soil conditioners and for check plots. Four replications of each conditioner were included, and plots were laid out allowing 10' x 60' for each treatment. Complete randomization within the replicates was established in accordance with accepted test procedures.

The chemicals were applied according to manufacturer's specifications with the exception that the soil was cultivated prior to treatment. Soil samples were taken before and after the test to measure the change in aggregation by the addition of synthetic conditioners. The first "after" samples were taken on July 21st following rain, and the last samples were taken in December.

The following table includes the per cent of water stable aggregates obtained when treatments were made using the various synthetic soil conditioners tested.

Depth of Treatment 6"		
Conditioner	**July**	**December**
A	36.8	21.8
B	31.8	16.1
C	30.1	12.1
D	41.2	15.0
E	30.8	16.0
F (Check	32.0	13.8
H	34.7	22.4
I	32.1	28.1
J	39.3	17.3

L	72.4	57.8
M (Check)	31.6	15.1
N	53.2	32.8
O	38.4	20.2
P	37.9	22.2
R	33.4	11.5
S	66.8	44.1
U	36.6	17.9
V	30.2	15.7

Names of the most effective conditioners will be furnished on request by Doane Agricultural Service, 5144 Delmar Blvd., St. Louis, Mo.

Bulletin On Transportometer Line

Sintering Machinery Corporation, Transportometer Division, Netcong, N. J., offers a new 8-page bulletin covering the complete Transportometer line of continuous, automatic weighing scales, which will be sent you on request.

The Transportometer line is used for accurate, precise control of production input and output by automatic, continuous weighing, in transit, of raw, intermediate and finished materials and products. It consists of three basic models designed to meet any continuous weighing and feed regulating requirements:

Transportometer—for installation on new or existing belt conveyor. Transportoweigher — complete weighing and conveying unit. Transportofeeder—complete feed regulating, weighing and conveying unit.

Will Sonochemistry Help Fertilizer Industry?

We recently had a letter and a small but fascinating folder from Electrovert, Ltd of Canada, whose German sources are ready to build Ultrasonic devices for anyone who needs them. They tell us all sorts of interesting new results are achieved by the use of these devices which, of course, use the principle of vibration developed by sound waves beyond the power of the human ear.

Their relationships with users are very confidential. They say they will not reveal who owns these devices, except by special permission of the owners.

If interested, send them the technical data on your need, and they'll figure the price of tailored Ultrasonic equipment to fit.

● NOW you can handle granular fines without danger of contamination! Blaw-Knox Chemical and Fertilizer Buckets are equipped with tight fitting cast chrome-nickel-molybdenum alloy steel lips to stop leakage and resist abrasion. For a detailed description on all the important features, write for Bulletin 2378.

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Cut Production Costs—
Speed up your plant with
ATLANTA UTILITY FERTILIZER MACHINERY

Fertilizer Mixing Systems
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Jeffrey Hercules Chain and "CHAIN-SAVER" Sprockets make the best wearing combination you can put into your plant. Chains can be reversed—have full diameter, D-shank pins—oval eccentric barrel. Sprockets have flanged edge—takes part of the load.

Also Digger and Loaders, Pulverizers, Conveyors, Elevators, Chains and Attachments, Feeders, etc.

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SOUTHERN STATES PHOSPHATE and FERTILIZER CO.
SAVANNAH, GEORGIA
Manufacturers of SULPHURIC ACID, SUPERPHOSPHATE, COMPLETE FERTILIZERS
and ALL TYPES OF BASE GOODS
EXPORT ORDERS SOLICITED

NORTH CAROLINA SAFETY MEETING

By TEX WATTS, *Chairman*

Cooperation and housekeeping were the keynotes heard by those attending the Fertilizer Section of the North Carolina Statewide Industrial Safety Conference at Winston-Salem May 13-15 as the speakers in the Fertilizer Section emphasized again that effective safety programs must have the cooperation of management, supervision, workers, union, and wives to be successful. Invariably the plants with good housekeeping programs have good saftey programs that assist production, maintenance and protect capital investment.

Of approximately 45 persons attending the Fertilizer Section, about 90% were members of the fertilizer industry. The others present were visitors from the N. C. Dept. of Labor, insurance companies, and other companies in the chemical field.

Hugh S. Surles, Safety Director of Planters Cotton Oil & Fertilizer Co., Rocky Mount was selected Chairman for 1954. The program committee has been appointed and work on an even better program next year will begin very soon.

Wilford G. Jones, Safety Director of the R. J. Reynolds Tobacco Company, presented one of the most persuasive talks any of the folks at the Fertilizer Section had heard. In his talk Mr. Jones said they took safety to the employees. Here are a few highlights from his talk:

In 1946 R. J. Reynolds Tobacco Company had an accident frequency rate of 10.2. Though this did not classify it as a dangerous place to work, such a record was disturbing to the management of the company. The management refused to accept the attitude that accidents are a part of normal business operations. The approximately 11,000 employees of the company were believed to be the key to the problem. If they could be made thoroughly conscious, the accidents could be avoided.

In 1947 the company organized Safety Committees comprised of the supervisors and foremen who were to serve as safety inspectors from time to time. At the end of an inspection tour, the inspectors met with Mr. Jones to discuss their ideas for improving job safety. Safety inspection teams composed of on the line workers were instituted in 1949. Through this rotating committee of oilers, mechanics, repairmen and machine operators each department is getting a new understanding of the safety problems and solutions of other departments. Further when they return to their own departments, they look at their safety programs with new insight.

In addition to this, regular inspections are made by the saftey engineer, who talks with supervisors about problems in their departments.

An important part of the program is good housekeeping. Clean, orderly, and well-lighted surroundings made a pleasant place to work which in turn helps make pleasant, safe workers.

Using all these and other methods, the company got gratifying results. By the end of 1950 the company's accident frequency rate had been reduced to 3.2 and in 1952 they had a frequency rate of 1.8, the lowest of any company doing corresponding work.

In 1951, Duke C. Dorney, an official of the Maryland Casualty Company presented a silver plaque to J. C. Whitaker of R. J. Reynolds Tobacco Company for the outstanding safety accomplishments of the five years 1946-1951, and in so doing, said that the splendid achievements had been made possible by everybody **working together.**

Other speakers included C. T. Wright, safety engineer of the

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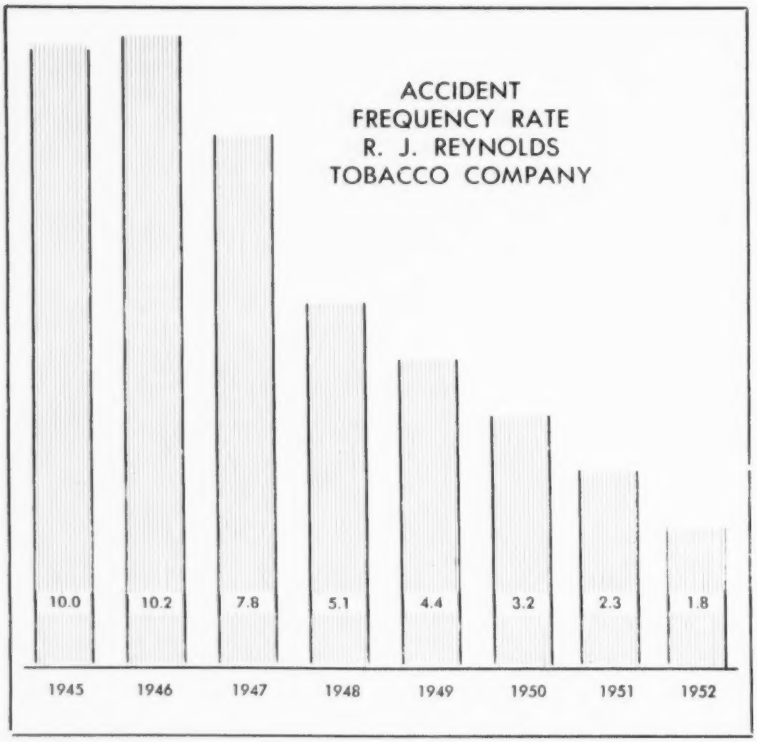

Crop, Soil Societies Meet Dallas, Nov. 16-20

The 1953 annual meetings of the American Society of Agronomy and the Soil Science Society of America will be held November 16-20 at Dallas, Texas, according to an announcement from officials of the two groups.

An estimated 250 papers on new developments in crops and soils will be presented during the course of the meetings. The programs are open to anyone concerned with crop production and soil problems, and interested persons are invited to attend.

H. E. Myers, associate director of the Kansas Agricultural Experiment Station, Manhattan, Kansas, is president of the American Society of Agronomy. Eric Winters, soil scientist with the Tennessee Valley Authority, Knoxville, Tennessee, is president of the Soil Science Society of America.

Both societies consist of specialists in crop and soil problems. The combined membership of 2200 includes representatives from commercial and industrial organizations, agricultural colleges, and federal and state agencies.

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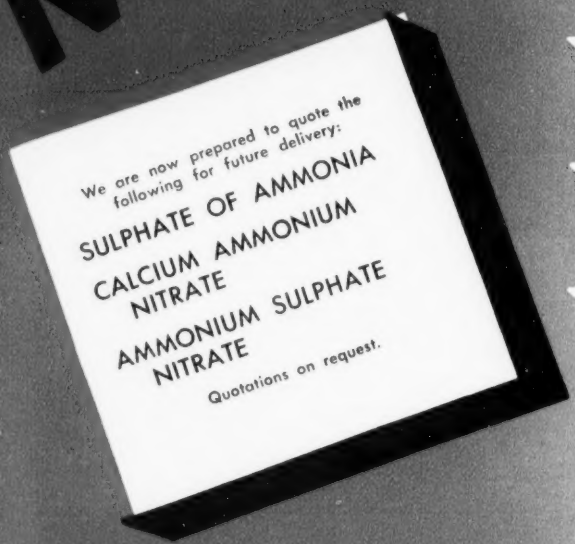
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